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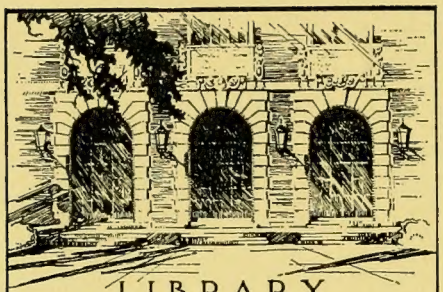

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WATERFOWL HUNTING IN ILLINOIS: ITS STATUS AND PROBLEMS

Frank C. Bellrose, Jr.

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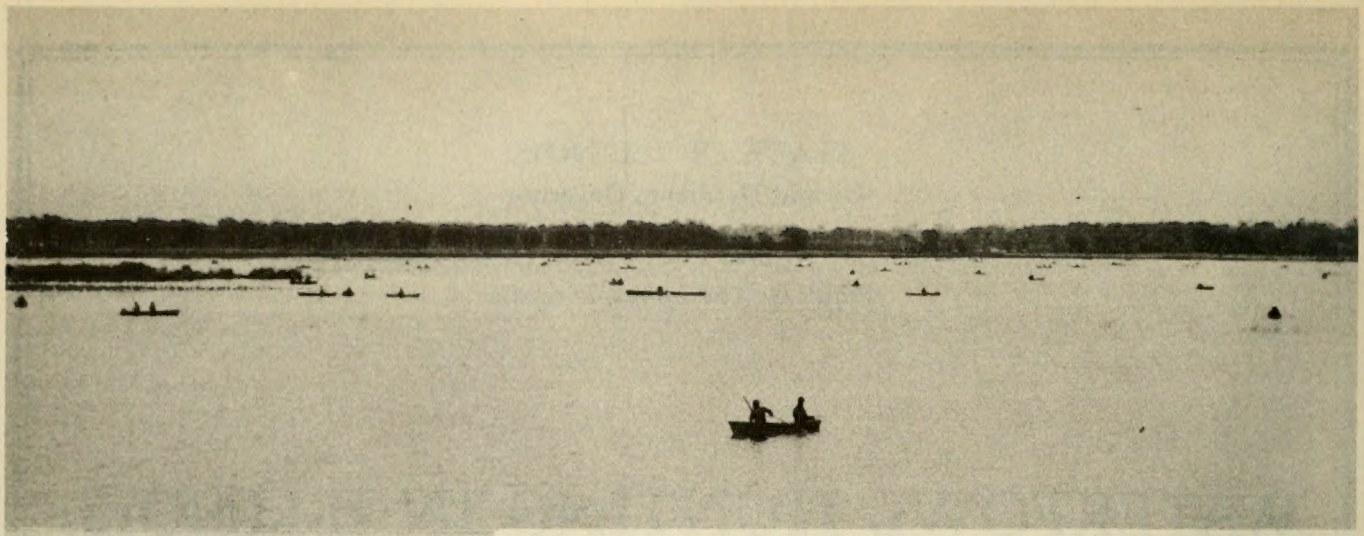

Grass Lake (above) near Antioch, Illinois, October 15, 1943. Hundreds of boats dotted this 1,800-acre body of water on the opening day of the hunting season, when over 18,000 coots and 100 ducks were bagged. Most of this lake is open to public hunting.

Canada geese (left) in flight above timber near Horse Shoe Lake, Alexander County, scene of one of the greatest goose concentrations in the nation.

Waterfowl hunting area (below) in the Illinois River valley. An abundance of natural foods makes this marsh a favorite with mallards and pintails. Water levels in this area are controlled by a system of levees.

WATERFOWL HUNTING IN ILLINOIS: ITS STATUS AND PROBLEMS

Frank C. Bellrose, Jr.
Assistant Game Technician

As the limited amount of waterfowl territory in Illinois has become increasingly burdened by hunters, discussions on the real or fancied ailments of wildfowling have waxed hotter and longer. The free-lance hunter has blamed the duck club for his empty bag, or his fellow sportsmen in adjoining blinds. The duck club hunter has blamed the mechanically picked cornfields, the rest lake of some adjacent club or the nearby waterfowl refuge. In an attempt to evaluate some of the waterfowl hunting problems, with a view toward better management and distribution of the harvest, this study was undertaken.

Grateful acknowledgment is made of the cooperation of several boat-livery operators who assisted in the gathering of data at nearby public shooting grounds in the Illinois River valley: William Grollmitz and Clint Warren, Liverpool; Harry Riesch and Robert Deyo, Spring Lake; the late Scott Osborn, Sparland; and Dick Reed, Chillicothe. Assistance of the State Department of Conservation in the loan of duck club kill records and in the check of the coot kill at Grass Lake also is acknowledged with appreciation.

Hunting licenses sold in Illinois, 1940 through 1942, averaged 330,791, according to State Department of Conservation records. During the same 3-year period an average of 77,533 duck stamps was sold annually in the state. Thus, in the years of this study, about one hunter out of every four in Illinois pursued the sport of waterfowling. Since the duck stamp act went into effect in 1934, the number of waterfowlers, as shown by stamp sales, has risen from 36,337 in 1935 to 64,212 in 1940, 84,997 in 1941 and 83,391 in 1942.

From all accounts, the number of waterfowl hunters in the state has steadily risen since 1900, with a sharp accentuation after World War I. Many middle-aged residents can remember back in the early 1900's, when on choice Illinois River lakes the hunter was free to put out blocks almost anywhere, and when he might not find another hunter within a mile or more. If the hunter made a blind, it was regarded by others as his sanctum sanctorum, and others would not appropriate it even when vacant.

All this has changed with the passing of two score years. Where once there were no trespass signs, today there are many. Where once hunting trips lasted a week or two, today they last a day or two. Where once there was one hunter, today there are 25. And not only has the number of waterfowlers increased, but since 1900 many marsh and water areas throughout the state have been drained, so that we now find only a fraction of the duck land once present in Illinois. According to information provided by Professor C. L. Stewart of the University of Illinois, more than 13 per cent of the total area of the state, or about 5,000,000 acres, has been involved in drainage enterprises.

Not only have vast inland marshes been drained, but, as reported by Mulvihill & Cornish (1929), almost 200,000 acres of the Illinois River bottomland subject to overflow have been leveed and drained. A similar condition exists along the Mississippi River where drainage districts extend almost continuously from Rock Island to Cairo.

We find today only approximately 250,000 acres of waterfowl habitat -- open water, marshes and swamps -- in Illinois, where about 77,000 waterfowlers must seek their sport. In contrast, there are more than 30,000,000 acres of upland hunting territory for the 300,000 upland game hunters. Whereas the upland game hunter has an average of 100 acres on which to roam, the duck hunter has little more than 3.

It is well known that the high density of upland hunters in some parts of Illinois, especially near large centers of population, has caused the closing of many farm lands to hunting. Less widely known is the fact that, because two-thirds or more of the waterfowl habitat in the state is under private control, three out of five waterfowlers have difficulty in locating a favorable hunting place.

T Y P E S O F A R E A S

An Illinoisan wishing to hunt ducks today has four alternatives. He can (1) join a private club or be a guest at one, (2) pay by the day at some commercial daily fee club (3) take "potluck" on some of the "open" areas not under private ownership, (4) purchase duck land and hunt on his own property.

Private Hunting Grounds

About 10 per cent of the Illinois waterfowlers belong to private duck clubs, or hunt at daily fee clubs. An additional 2 per cent, composed of guides and caretakers, hunt on private duck club grounds during the course of the season. Membership fees at private duck clubs range from $35 to over $1,000 each, depending on the number of acres owned by the club, the value of the grounds and clubhouse, and other sundry facts. In addition, each member must pay a yearly maintenance fee, and, at many clubs, lodging, food and guide or "pusher" fees. There are about 700 waterfowl clubs registered in Illinois each year; club licenses issued by the State Department of Conservation in recent years were as follows: 644 in 1940, 792 in 1941 and 700 in 1942. There are 2 to 50 members per club, with an average of 10 per club. There are only about 50 large clubs in Illinois.

In addition to the 12 per cent of the Illinois waterfowlers hunting at duck clubs, about 3 per cent (2,000) primarily pursue Canada geese at the 42 to 77 clubs (1940 through 1942) in the Horse Shoe Lake region of Alexander County. The daily fee goose clubs in this region have furnished annually (1940 through 1942) about 4,000 man-days of hunting. From cursory inspection of the records, it is apparent that the average goose hunter shoots 2 days per season. The area is estimated to have provided about 10,000 man-days of hunting in 1943.

Clubs offering daily fee shooting privileges, as listed by the State Department of Conservation in 1940, numbered 76. The writer knew of 15 additional day-shooting places not listed. Prices for day waterfowl shooting range from $3 to $20 per person per day, $10 being the usual charge. Most, if not all, day-shooting places limit the number of hunters on their premises, and, consequently, reservations are generally made in advance.

Public Hunting Grounds

Most waterfowlers who do not care to or who are financially unable to own duck land, or belong to a private club, or hunt at day shooting areas, must resort to state or federal public shooting grounds for their sport. About 85 per cent of the waterfowl hunters in the state belong to this last group, the free-lance hunters. Fig. 1 shows the location of the known free-lance waterfowl shooting grounds within the state in 1942. Since completion of this study, the Rice Lake Shooting Area near Banner, about 25 miles southwest of Peoria, has been purchased with state and federal funds. Half of the more than 2,000 acres of marsh and water, administered by the State Department of Conservation, will be open to public shooting, and the other half will be reserved as a waterfowl refuge and feeding area.

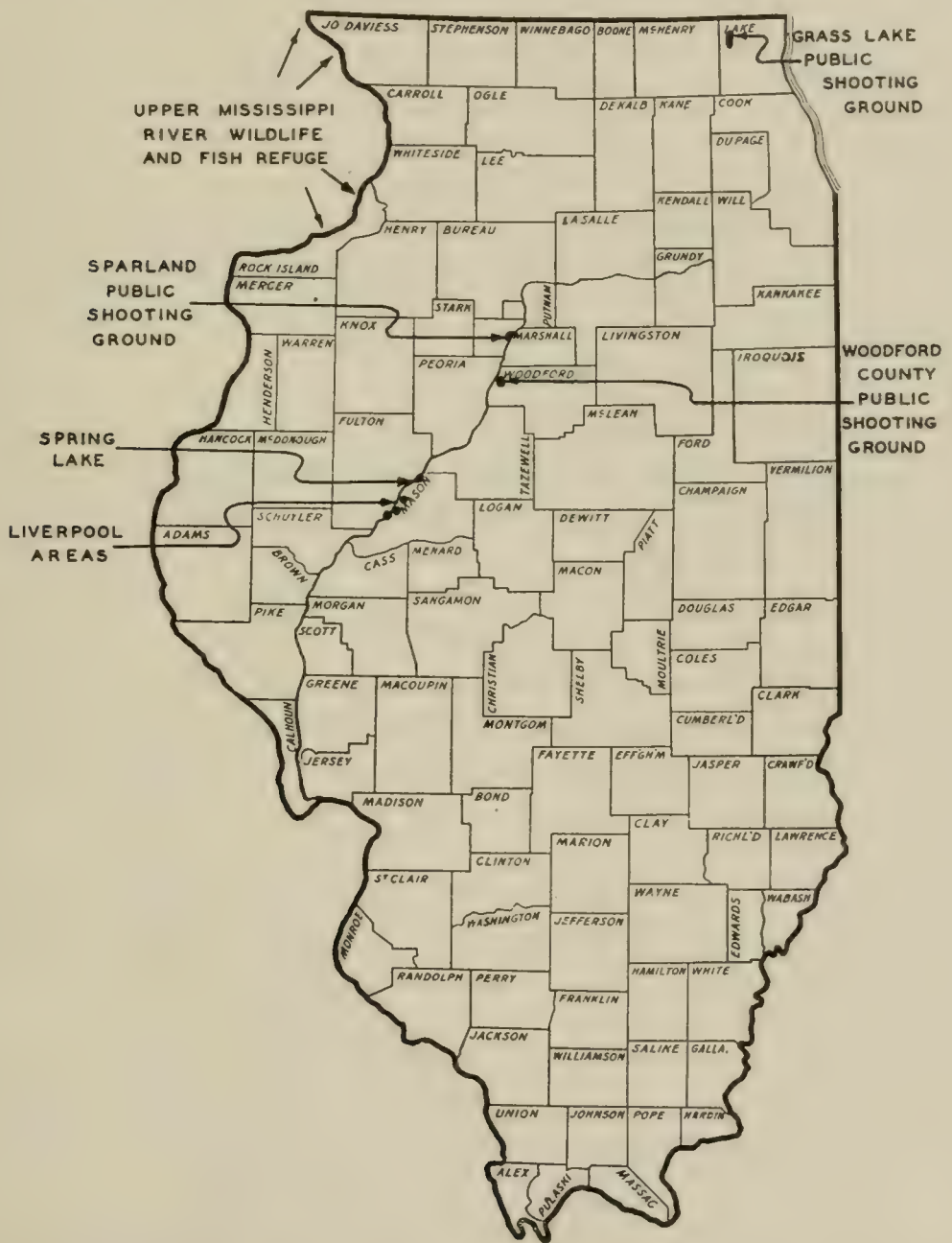

FIG. 1.-- Free-lance waterfowl shooting grounds in Illinois, 1942. Another area, near Banner, about 25 miles southwest of Peoria, was added late in 1943, after completion of this study.

Although some waterfowl hunting is prevalent in most of the 102 counties in Illinois, it is of negligible importance in 40 counties and is an important sport in only 33 counties. These 33 counties are located in four general regions in the state: (1) the glacial lakes region in northeastern Illinois, known popularly as the Chain-O'-Lakes region; (2) the Horse Shoe Lake area in Alexander County; (3) the Mississippi River valley, principally from East Dubuque to Alton; and (4) the Illinois River valley from Channahon to Grafton, but mainly from Ottawa to Meredosia.

GLACIAL LAKES REGION

The glacial lakes, or Chain-O'-Lakes, region is within an hour or two transportation time of about 4,000,000 Illinois people. Consequently, it receives a heavy recreational pressure that affects the waterfowl population at all seasons. Most of the marsh and water territory on the Chain-O'-Lakes -- Marie, Grass, Nippersink, Fox and Pistakee -- is under public control, and public hunting is therefore permitted. However, there are a number of private lakes and marshes in the region where clubs control the hunting. Some clubs lease blinds to individual hunters or groups of hunters, others operate on an exclusive membership basis, while a few operate on a daily fee basis. In 1940 the State Department of Conservation listed only two daily fee places in this region.

The majority of free-lance hunters rent boats from the numerous boat yards studding the shores of these lakes. Most of the waterfowl hunting is confined to 1,800-acre Grass Lake, where hunters depend almost entirely upon coot or mud hen shooting for their sport.

A check of the coot population and kill in the region was made by Dr. Jessop B. Low and the writer during the first 2 days of the 1942 season. According to all reports, most of the hunting there occurs during the first few days of each season, and hunting records at duck clubs in the region support this contention. Only small numbers of hunters turn out with the arrival of later coot flights, and only a very few hunters consistently hunt ducks until the freeze-up, which generally occurs the latter part of November.

On the opening day of the 1942 waterfowl hunting season, we checked the bag of 521 free-lance hunters at Grass Lake. These hunters bagged 6,461 coots -- an average of 12.4 per hunter -- and 59 ducks, an average of 0.11. Most of the ducks were ruddies.

We computed that boats on the lake averaged 1.6 hunters per boat. From boat liveries on and around Grass Lake, 790 boats were rented for shooting on that lake. Less than 2 per cent of the hunters brought their own boats. Unknown is the number of boats used by hunters owning cottages around and adjacent to the lake. All data we have, including counts made of boats anchored at cottages on lakes Marie and Grass, indicate that the minimum number of boats in use at Grass Lake on the opening day was 1,000 and the maximum number 1,500, with 1,200 probably the actual number.

Since we computed there were 1.6 hunters per boat and the average bag of the hunters interviewed was 12.4 coots and 0.11 duck, we calculated that free-lance waterfowl hunters at Grass Lake took about 23,800 coots and 211 ducks on the opening day of the 1942 season. In a census we made the day prior to the opening of the season, we placed the number of coots on Grass Lake at about 25,000. A trip about the waters of Grass Lake after sunset of the opening day disclosed not over 150 visible coots. However, the next morning, when shooting again commenced, from 1,200 to 1,800 coots were estimated to be on the lake. Either more coots arrived during the night or many were among the bulrushes at the time of the evening census and so were not counted. These censuses before and after shooting, compared with the estimated kill, indicate that about 90 per cent of the coots on Grass Lake were removed the opening day in 1942.

On the second day of the 1942 season, 135 boats averaging 1.6 hunters each were enumerated on Grass Lake. These hunters averaged only 4.4 coots apiece, for a total kill of about 950 birds.

On the opening day, 1942, approximately 1,920 hunters were on the 1,800 acres of Grass Lake, or one hunter per 0.95 acre. Probably nowhere else on the North American continent is shooting pressure greater on a single day than on this lake. On the second day, shooting pressure declined to 1 hunter per 8.3 acres. Thereafter hunting pressure declined still more except, perhaps, for small spurts on week-ends when additional small flights of coots alighted in the region. At no other time, however, did the number of hunters or coots present or the kill compare with that of the opening day. Figs. 2, 3 and 4 show that the number of hunters at clubs in the region declined sharply after the opening day.

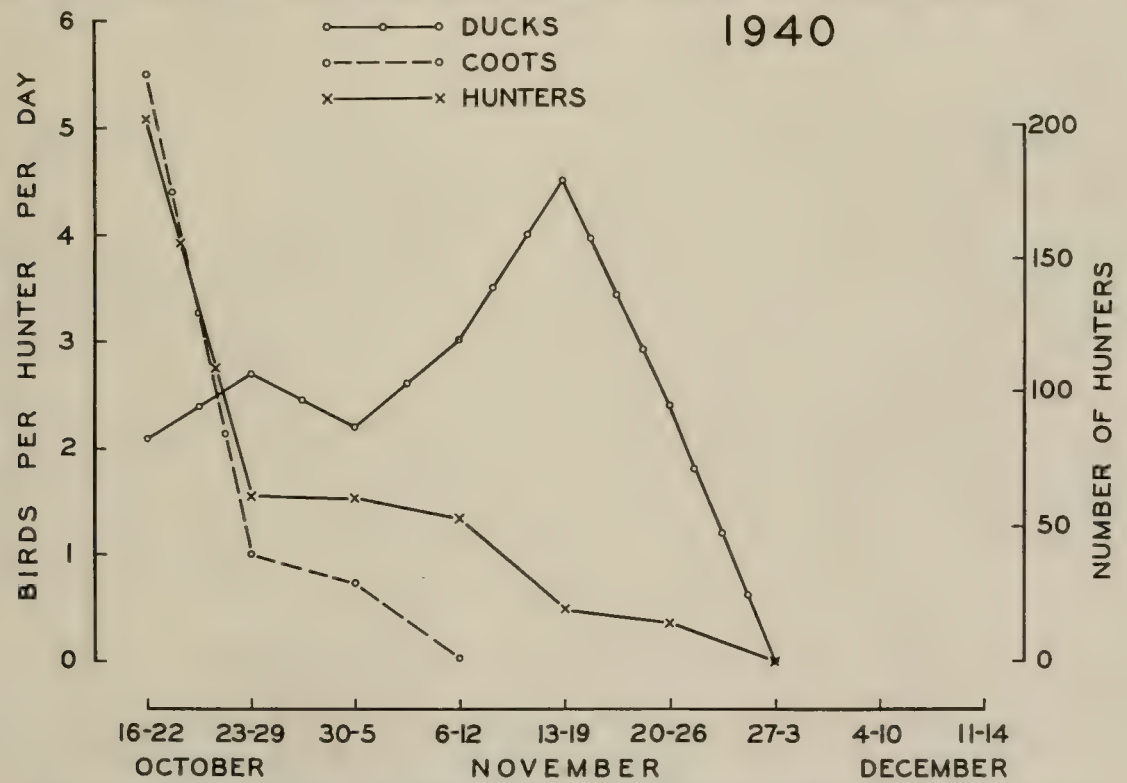

FIG. 2.-- Trend in kill of ducks and coots per hunter per day compared with trend in number of hunters per day at private hunting clubs in the glacial lakes region of Illinois, 1940.

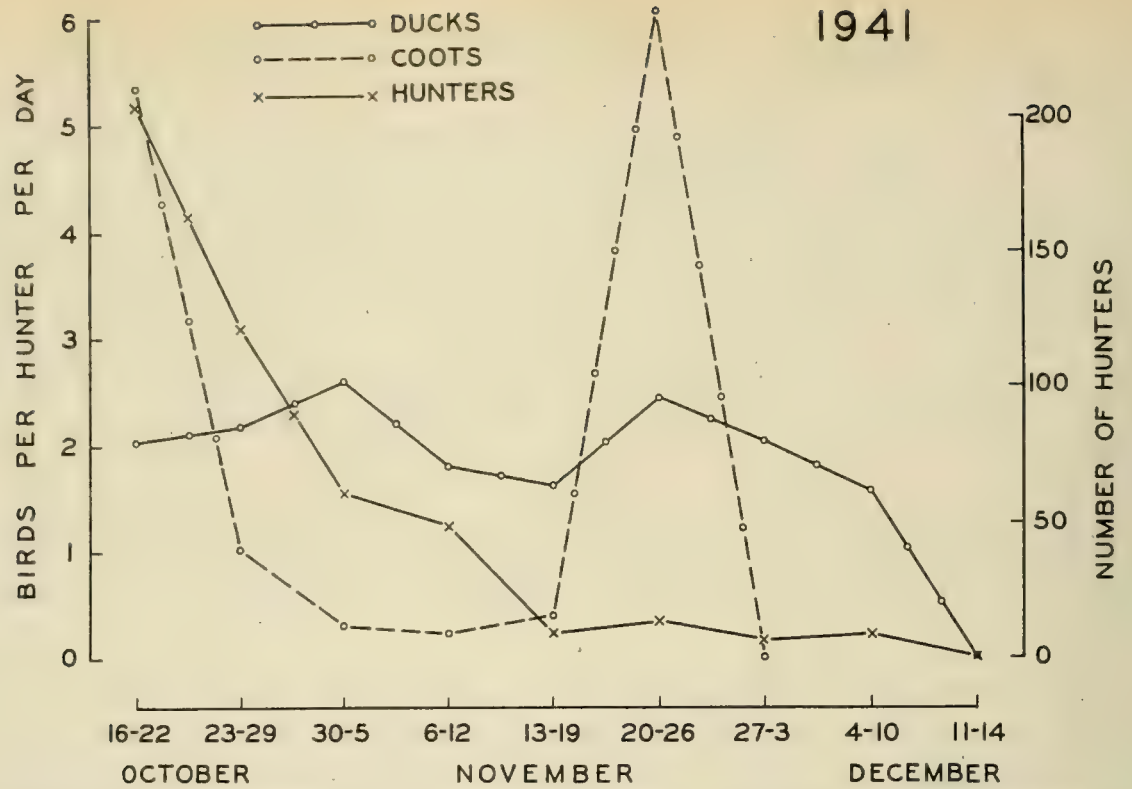

FIG. 3.-- Trend in kill of ducks and coots per hunter per day compared with trend in number of hunters per day at private hunting clubs in the glacial lakes region of Illinois, 1941.

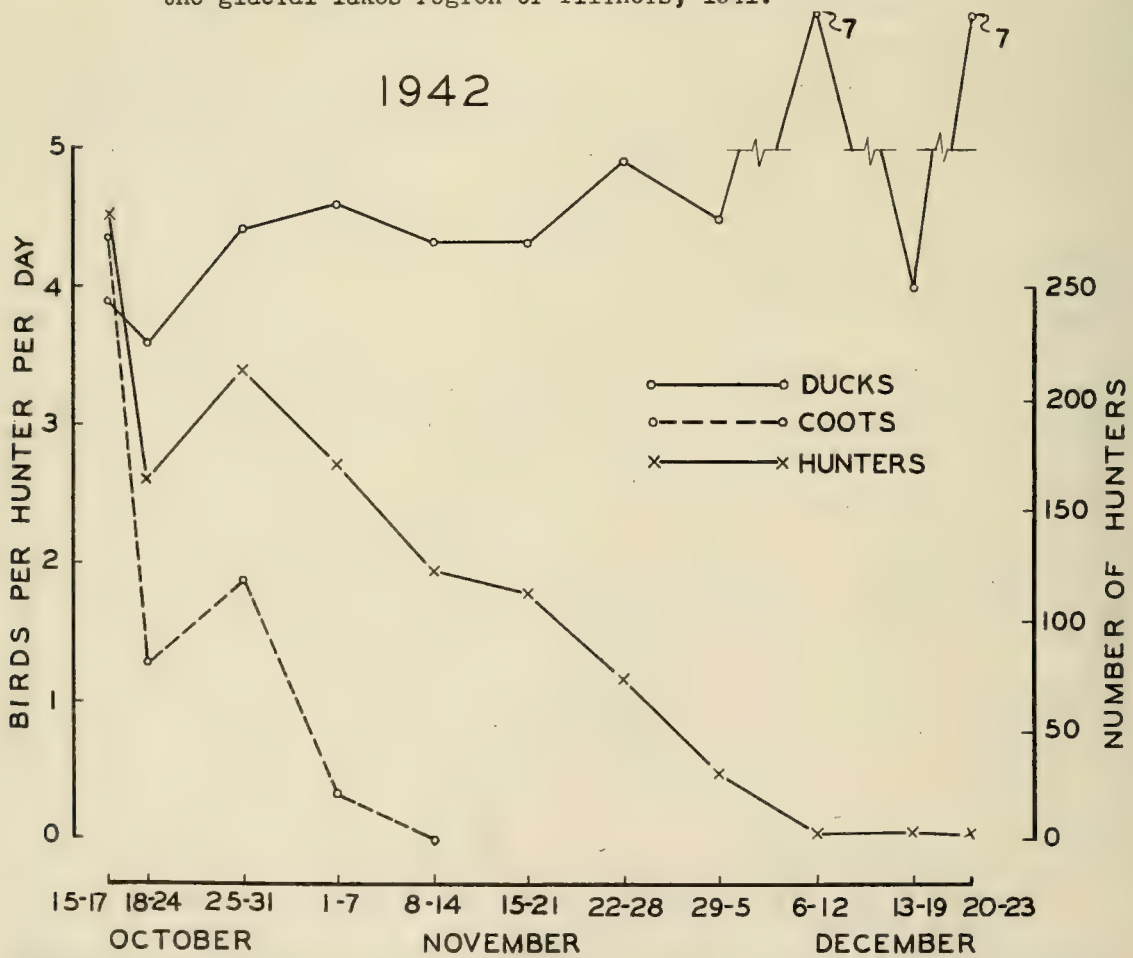

FIG. 4.-- Trend in kill of ducks and coots per hunter per day compared with trend in number of hunters per day at private hunting clubs in the glacial lakes region of Illinois, 1942.

A similar check of Grass Lake made on October 15, the opening day of the 1943 season, showed that probably 750 boats were on the lake (700 minimum, 800 maximum) with an average of 1.8 hunters per boat. Calculations made from a liberal sampling of boats and bags indicated that 1,350 hunters were in action and that they bagged 18,225 coots and 108 ducks.

Censuses of Grass Lake made on the evening before the 1943 opening day and in the early afternoon of the fifteenth indicate that the kill in the morning amounted to about 95 per cent of the number of coots and about 15 per cent of the number of ducks present the night before. Relatively few birds were killed after noon on the fifteenth. These figures show that coots are many times more vulnerable to hunters' guns than are ducks, even when most of the ducks are the relatively vulnerable blue-winged teals that made up the greater part of the duck population at Grass Lake late in the afternoon of the fourteenth and early in the morning of the fifteenth.

A survey of the situation at Grass Lake on October 16, 1943, revealed 75 boats on the lake, averaging 1.6 hunters per boat. Hunters averaged 1.55 coots and 0.05 duck each. Computations show for this day at Grass Lake that 120 hunters killed a total of 186 coots and 6 ducks.

While there were fewer hunters on Grass Lake on the first 2 days of the 1943 season than on corresponding days in 1942, the difference between the coot kill in the two seasons is believed to have been due mainly to the lower number of coots in 1943. Despite the 1943 shortage of shot gun shells, gasoline and tires, the opening days of the two seasons were much alike.

The close relationship between number of hunters and the coot bag is in evidence even at private clubs, which average a much greater kill of ducks per individual hunter than do public grounds. At private clubs in the glacial lakes region, the number of hunters per day dropped from 203 the first week to 62 the second week in 1940, fig. 2; for corresponding weeks the drop was from 205 to 122 in 1941, and from 281 to 164 in 1942, figs. 3 and 4. These drops almost parallel the decline in the coot bag of 5.5 per hunter per day the first week to 1.0 per hunter per day the second week of the 1940 season and, for corresponding weeks, from 5.3 to 1.0 in 1941 and from 4.3 to 1.3 in 1942. The decrease in hunter pressure at private clubs in northeastern Illinois continued as the season advanced despite the increased number of ducks killed per hunter per day. Free-lance waterfowl hunting declined even more rapidly than did hunting at private clubs.

At clubs in the glacial lakes area the average bag was 2.35 ducks and 2.93 coots per hunter per day in 1940, 2.08 ducks and 2.76 coots in 1941, and 4.23 ducks and 1.64 coots in 1942, table 1 and figs. 5, 6 and 7. During the first and third years, environmental conditions were more or less normal, while during the second year high water turned marshes and fields into lakes.

Table 1.--Species and numbers of ducks bagged per hunter per day at waterfowl hunting clubs in the three main duck regions of Illinois (private clubs only for 1940 and 1941, private clubs and day shooting clubs combined for 1942).

Species	Glacial Lakes			Mississippi River			Illinois River		
	1940	1941	1942	1940	1941	1942	1940	1941	1942
Mallard and black duck	1.07	0.99	2.21	3.10	2.97	3.39	4.46	3.94	4.65
Pintail	0.26	0.24	0.63	0.42	0.23	0.26	0.68	0.53	0.38
Blue-winged teal	0.19	0.15	0.34	0.20	0.17	0.20	0.08	0.14	0.16
Green-winged teal	0.39	0.19	0.15	0.45	0.10	0.20	0.25	0.10	0.09
Baldpate or widgeon	0.08	0.13	0.18	0.02	0.08	0.04	0.07	0.19	0.12
Gadwall	0.05	0.04	0.10	0.09	0.05	0.06	0.13	0.12	0.08
Shoveler	0.06	0.10	0.07	0.06	0.07	0.05	0.06	0.06	0.06
Lesser scaup	0.14	0.11	0.27	0.32	0.34	0.30	0.15	0.48	0.33
Ring-necked duck	0.03	0.02	0.06	0.02	0.25	0.36	0.12	0.41	0.14
Canvasback	0.02	0.02	0.04	0.01	0.02	0.04	0.02	0.10	0.12
Ruddy duck	0.00	0.01	0.06	0.01	0.02	0.03	0.01	0.01	0.05
Redhead	----	----	0.05	----	----	0.03	0.01	0.01	0.03
Other ducks	0.06	0.08	0.07	0.06	0.04	1.03	0.00	0.03	0.04
Total	2.35	2.08	4.23	4.76	4.34	5.99	6.04*	6.12	6.25

*The difference of 0.01 between this figure and the corresponding figure in table 3 resulted because data in this table were calculated for each species separately to nearest hundredth.

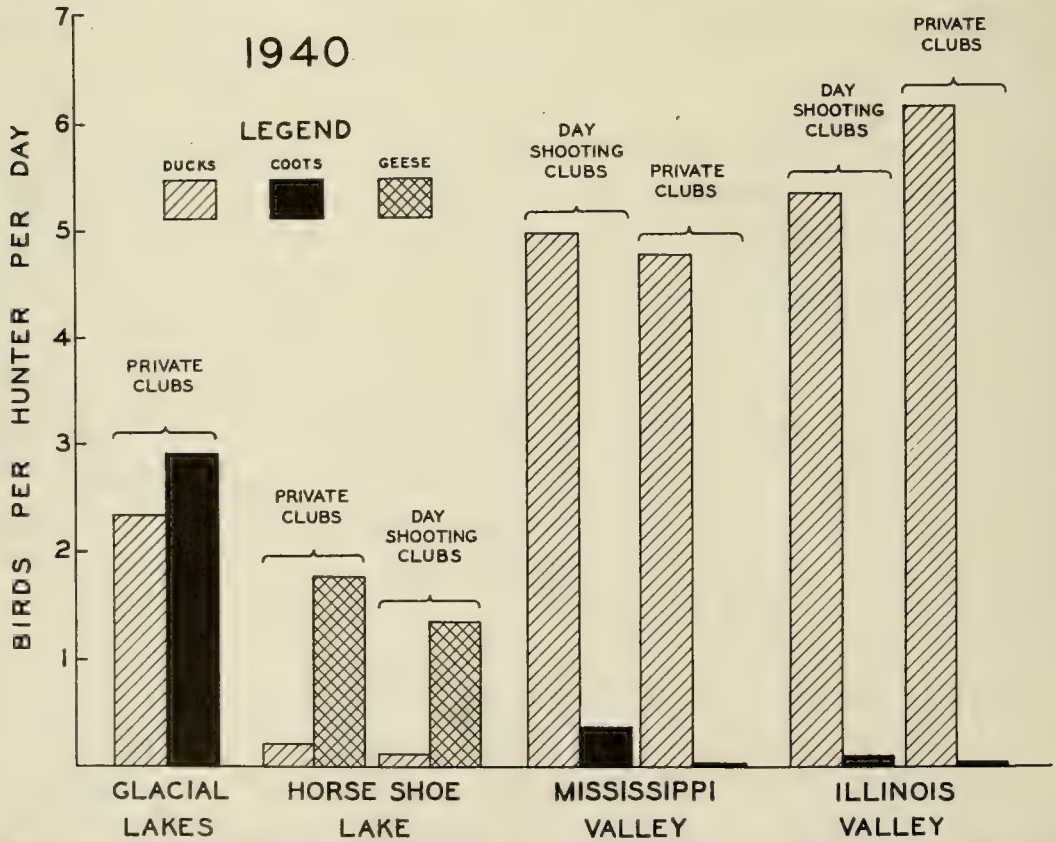

FIG. 5.-- Comparison of the average kill per hunter per day at private clubs and day shooting clubs in four Illinois areas, 1940.

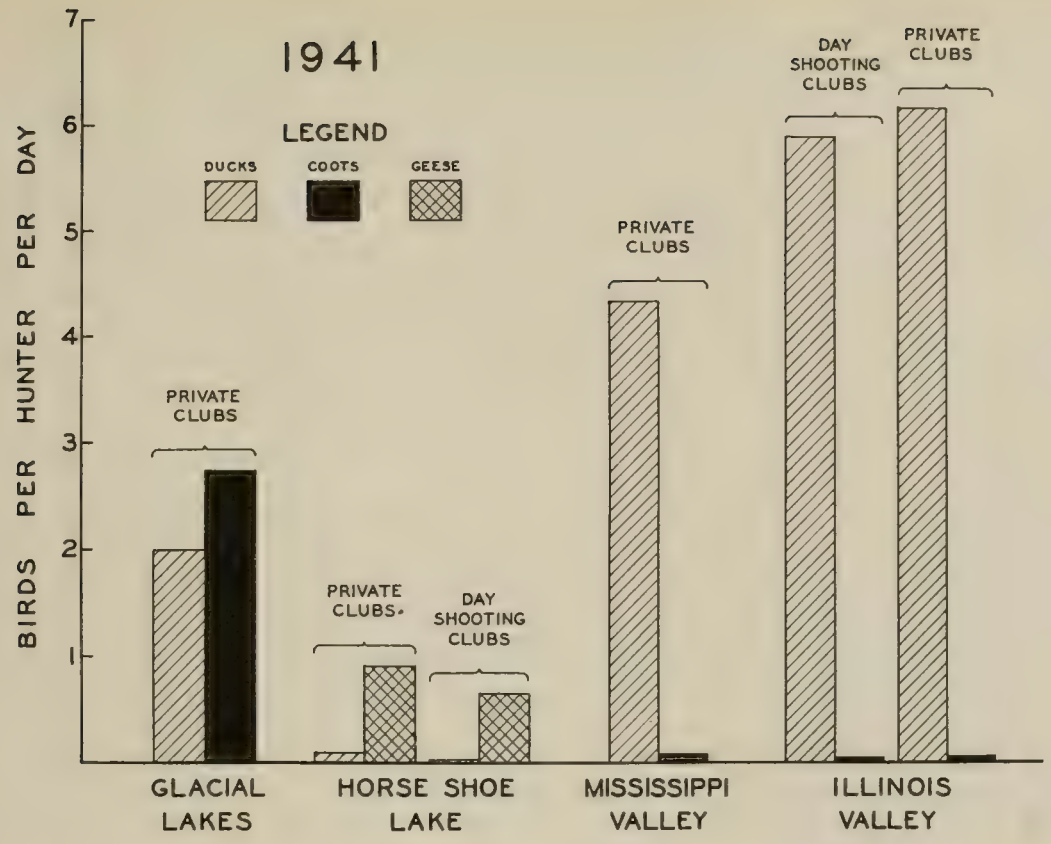

FIG. 6.-- Comparison of the average kill per hunter per day at private clubs and day shooting clubs in four Illinois areas, 1941.

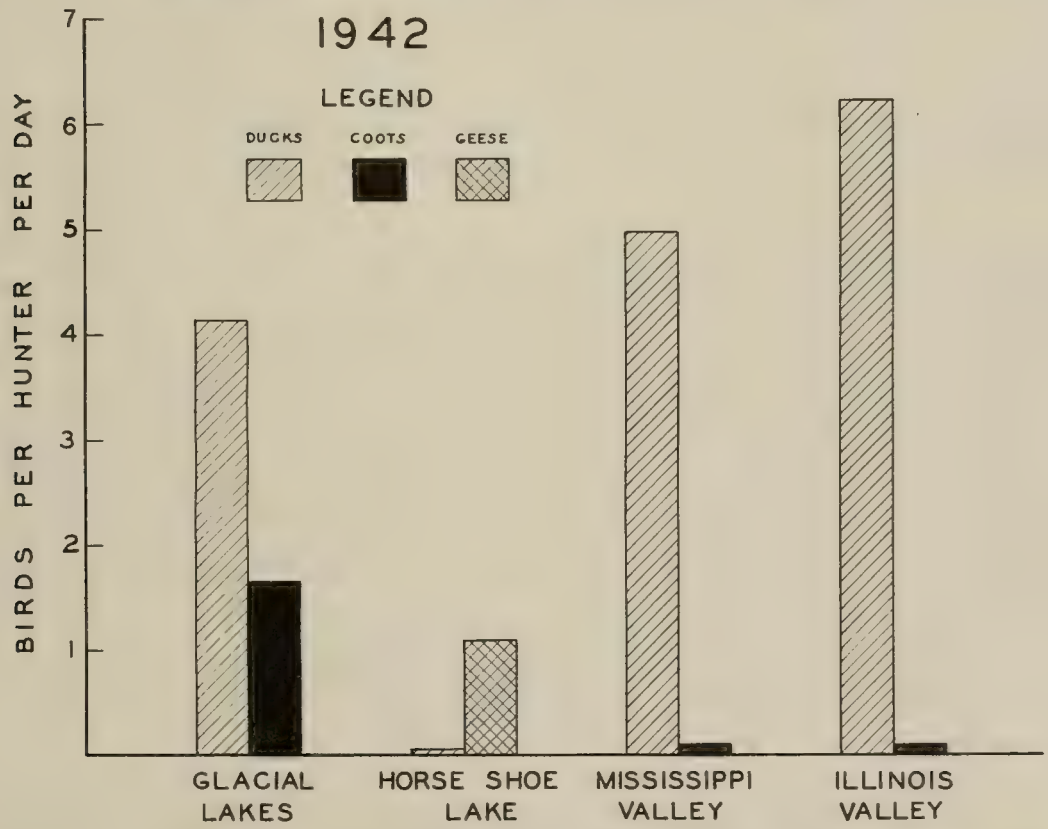

FIG. 7.-- Comparison of the average kill per hunter per day (private clubs and day shooting clubs combined) in four Illinois areas, 1942.

The duck bag of the glacial lakes region, broken down by species, table 1, discloses that about four times as many mallards as pintails were taken in 1940, 1941 and 1942. About 50 per cent more green-winged teals than pintails were taken in 1940, about 20 per cent fewer green-wings than pintails in 1941 and less than one-fourth as many in 1942. In 1940 and 1941, fewer blue-wings than green-wings were taken, but in 1942 the blue-wings in the bag numbered over twice as many as the green-wings. For the 3-year period, blue-winged teals formed a smaller part of the bag than green-winged teals but a greater part than baldpates, gadwalls or shovelers. Lesser scaups were the only diving ducks taken in numbers; for the 3-year period they totaled more than baldpates but less than either of the teals.

HORSE SHOE LAKE REGION

The Horse Shoe Lake region, north of Cairo in Alexander County, is the scene of one of the greatest Canada goose concentrations in the nation. The concentration of 40,000 to 50,000 honkers at the peak of the fall migration is due mainly to the 3,160-acre Horse Shoe Lake Game Refuge maintained by the State Department of Conservation. Surrounding this refuge are some 15,000 acres of farm land, much of which has been leased or developed for the purpose of shooting geese. However, most of the goose hunting occurs on 6,500 acres owned by 14 daily fee clubs and 4 private clubs.

In 1940, 66 private clubs were organized for the purpose of shooting geese in the Horse Shoe Lake area. In 1941, there were 77 such clubs and in 1942 there were 42. Only the 14 daily fee clubs and 4 private clubs mentioned above are of long standing. Other clubs are more or less impermanent organizations that kill in the aggregate comparatively few geese.

Day-shooting fees range from $5 to $10; the latter sum is the standard fee. Private clubs are composed mainly of individuals who band together to lease a farm tract for 1 or more years.

There are no generally recognized free-lance hunting grounds in the Horse Shoe Lake area, although there may be a few tracts not posted against trespass.

Figs. 5, 6 and 7 show graphically the average kill of geese and ducks per hunter per day in Alexander County in 1940, 1941 and 1942. It is interesting to note that hunters at private clubs averaged almost one-third more geese per hunter per day in 1940 and 1941 (in 1942 the two types of hunters were not differentiated) than did shooters at daily fee clubs; this in spite of the fact that, in 1941, 14 daily fee clubs killed 5,452 geese, while 17 private clubs reported only 622 geese. Evidently private clubs used their property much less intensively than did daily fee clubs. In Alexander County only a small number of ducks were taken; more were taken at private than at daily fee clubs. In this region, goose hunting greatly overshadows duck hunting.

The seasonal distribution of the individual daily bag of Canada geese and the hunting intensity in the Horse Shoe Lake region are shown in figs. 8, 9 and 10. The lowest goose

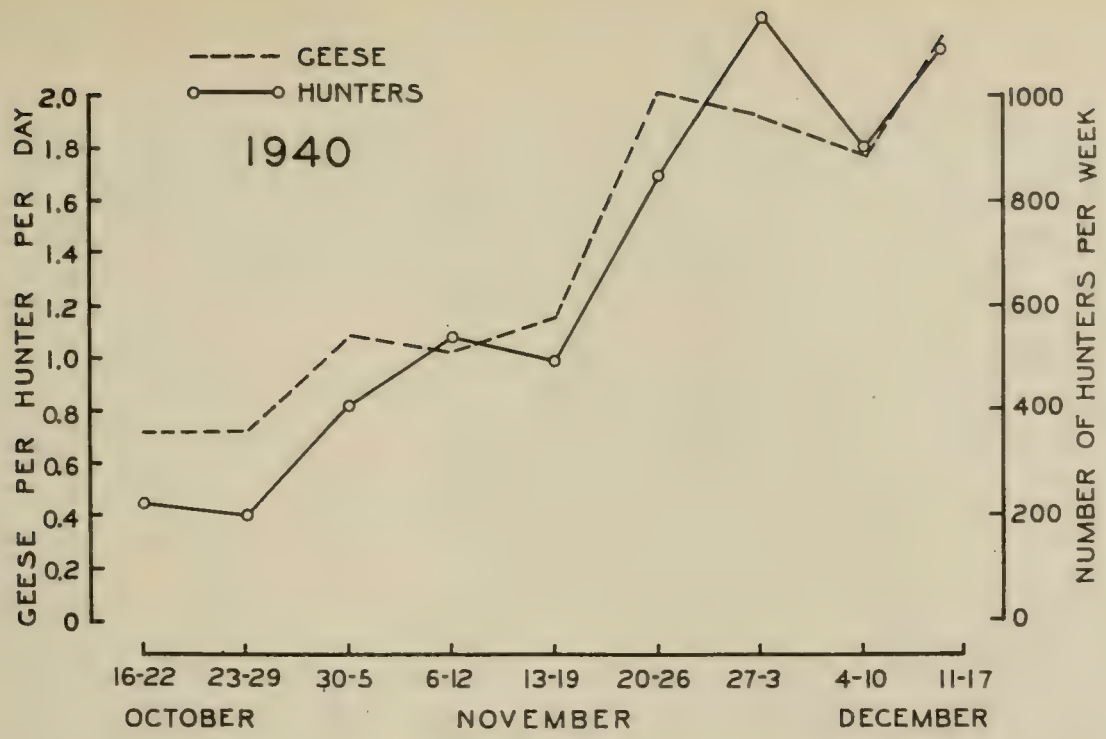

FIG. 8.-- Trend in the individual daily bag of Canada geese, compared with trend in number of hunters per week in the Horse Shoe Lake region, Alexander County, 1940.

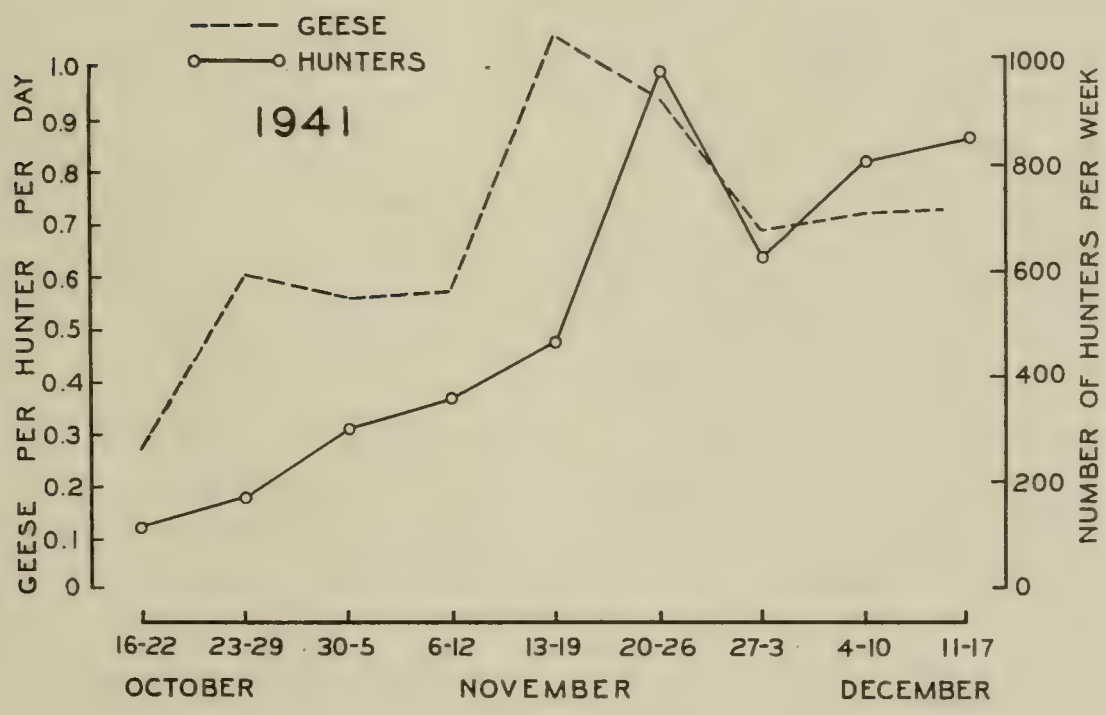

FIG. 9.-- Trend in the individual daily bag of Canada geese, compared with trend in number of hunters per week in the Horse Shoe Lake region, Alexander County, 1941.

FIG. 10.-- Trend in the individual daily bag of Canada geese, compared with trend in number of hunters per week in the Horse Shoe Lake region, Alexander County, 1942.

bags, as might be expected, occurred during the first half of the season; almost twice as many geese per hunter-day were bagged during the latter part of the season. In 1940, the highest bags of honkers were made during the week of November 20-26; in 1941, the highest individual daily kills occurred during the week of November 13-19, and in 1942 during the week of November 29-December 5.

News travels fast among goose hunters; figures show that as individual hunting success changed so did the number of hunters, although there was generally a slight lag in hunting intensity. In general, duck hunting intensity declines with the progress of the season, figs. 11, 12, 13; goose hunting intensity increases with the hunting success.

M I S S I S S I P P I R I V E R R E G I O N

Along the Mississippi River from East Dubuque in Jo Daviess County to Alton in Madison County, there are innumerable sloughs, lakes and ponds, and there are islands in the river which afford duck hunting. On the Illinois side of the Mississippi River, about 150 clubs obtained licenses to take waterfowl in 1941. Nine of these, according to a list prepared by the State Department of Conservation, offered hunting on a daily fee basis. Other clubs rented blinds for the season or sold restricted memberships for one season or longer.

As figs. 5 and 6 indicate, in 1940 and 1941, hunters at private clubs along the Mississippi River were over twice as successful in taking ducks as were hunters in clubs in

the glacial lakes district. Hunters in the Mississippi River area, however, shot only a small fraction of the number of coots per hunter-day shot by those in the other area.

In the Mississippi River region only two known day shooting places reported their duck kill in 1940 and only one in 1941. Fig. 5 shows that hunting success in 1940 was slightly greater at these daily fee clubs than at private clubs. However, because of the small sample, it should not be inferred that this situation is generally true.

Main differences in the duck bags of the two regions for the years of this report is that mallards, lesser scaups and ring-necked ducks were more numerous in the Mississippi River bag, while pintails, blue-winged teals, baldpates and shovelers were more numerous in the glacial lakes bag, table 1. The daily kill per hunter was about the same for green-winged teals, gadwalls, canvasbacks, redheads and ruddy ducks.

Apparently because of high water in 1941, the Mississippi River valley had a lower rate of kill of all dabbling ducks but baldpates and shovelers in that year than in 1940 or 1942. Appreciably more ring-necked ducks, canvasbacks, redheads and ruddy ducks per hunter-day were taken in 1941 and 1942 than in 1940. The highest lesser scaup kill occurred with the high water in 1941.

Free-lance hunters along the Mississippi River, from East Dubuque to Rock Island, were allowed to hunt on a large number of scattered purchase units of the Upper Mississippi River Wildlife and Fish Refuge. These units covered 19,629 acres in Illinois. In a letter of September 11, 1942, Ray C. Steele, Superintendent of the Refuge, stated: ". . . all portions of the Upper Mississippi Refuge within the State of Illinois are open to public recreation including hunting of migratory waterfowl during the open season, except about 1,200 acres within the boundaries of the Carroll County Drainage and Levee District No. 1, a short distance below Savanna, which is closed to public hunting."

South of the Upper Mississippi River Wildlife and Fish Refuge, open areas for free-lance duck hunters were found on government owned islands along the channel, as well as along many of the sloughs and backwaters. The amount of this territory actually available for public hunting is not known, but it ran into the thousands of acres. Much of this open territory along the Mississippi River was of poor quality for duck hunting.

On one of the better open areas near Batchtown, Illinois, 142 hunters bagged 130 ducks or 0.92 duck per hunter-day in 1941. Sixty-five free-lance hunters on lakes adjacent to the mouth of the Illinois River averaged 2.44 ducks per hunter-day the same year. This is considerably below the bag per hunter-day at private and day shooting clubs in the Mississippi River region in Illinois, but is similar to the bag at public shooting grounds in the Illinois River valley.

ILLINOIS RIVER REGION

The Illinois River flows diagonally southwestward through the heart of Illinois' big prairie district. From its source at the confluence of the Des Plaines and Kankakee rivers to its mouth at Grafton is 270 miles. While waterfowl hunting is conducted the entire length of the Illinois River valley, the most intensive hunting occurs from Bureau to Meredosia, where for 140 miles bottomland lakes flank the river channel.

The amount of territory available for waterfowl in these shallow-basined, fluviatile lakes varies greatly with the water level. In most years about 60,000 acres are available for duck hunting, but this acreage was greatly increased in the 1941 and 1942 seasons by high water. About 7 per cent of this area is open to public hunting; the remainder is under the control of private clubs or of individuals.

Duck clubs reach a peak in numbers, size and pretentiousness in the Illinois River valley. In 1941 about 55 per cent of the 792 waterfowl clubs in the state were in this section. Of the approximately 435 clubs in the Illinois River valley during the 1941 season, about 60 offered duck hunting on a daily fee basis. Most other clubs were private, composed for the most part of lifetime members. A few clubs sold seasonal memberships.

As shown in table 1 and figs. 5 and 6, hunters at private clubs in the Illinois River valley were more successful in bagging ducks than were those in other regions of the state. In 1940, Illinois River valley hunters bagged about 1.3 more ducks per hunter-day at private clubs than did members of Illinois clubs along the Mississippi River. In 1941, the bag per man-day at Illinois River valley clubs increased, while that at the Mississippi River clubs decreased so that the difference was about 1.8 ducks per hunter-day. High water seemingly had little effect on the individual daily bag at private clubs in the Illinois River valley, but it apparently adversely affected the daily bag along the Mississippi River. In 1942, the difference between the duck kill at clubs in the two regions was slightly less than 0.3 bird per hunter-day.

A comparison of the species kill of the Illinois and Mississippi River club hunters in 1940, 1941 and 1942, table 1, discloses that in the years of this study the Illinois River hunters bagged more mallards, pintails, baldpates, gadwalls and canvasbacks per hunter-day, while the Mississippi River hunters bagged more blue-winged and green-winged teals. The individual daily take was about the same in the two regions for shovelers, lesser scaups, ring-necked ducks, redheads and ruddy ducks.

A high water stage in the Illinois River valley in 1941 resulted in fewer mallards in the bag in that year than in 1940 or 1942, but more baldpates, lesser scaups and ring-necked ducks. Successively fewer pintails and green-winged teals were killed in the Illinois River valley each season following 1940, probably because of smaller flights. Increased numbers of canvasbacks and redheads coincided with larger bags of these species in 1942.

As figs. 5 and 6 show, daily fee club shooters in the Illinois River valley in 1940 and 1941 were only slightly less successful than those at private clubs.

A comparison of the species kill at private and day shooting clubs shows that, while the kill per hunter was almost the same, daily fee hunters bagged more "small" ducks, table 2. For instance in 1940, day shooters, while bagging 0.83 less mallard per hunter-day, averaged 0.25 more lesser scaup per hunter-day than did private club shooters. In 1941, the margin was wider; 1.27 fewer mallards but 1.40 more lesser scaups per hunter per day.

Table 2.-- Bag of waterfowl per hunter per day at private clubs, day shooting clubs and public shooting grounds, 1940 and 1941, in the Illinois River valley.

Species	1940			1941		
	Private Clubs	Day Shooting Clubs	Public Shooting Grounds	Private Clubs	Day Shooting Clubs	Public Shooting Grounds
Mallard and black duck	4.46	3.63	0.58	3.94	2.67	0.46
Pintail	0.68	0.73	0.16	0.53	0.23	0.03
Blue-winged teal	0.08	0.09	0.04	0.14	0.11	0.03
Green-winged teal	0.25	0.25	0.06	0.10	0.06	0.02
Baldpate or widgeon	0.07	0.06	0.02	0.19	0.26	0.05
Gadwall	0.13	0.09	0.01	0.12	0.90	0.03
Shoveler	0.06	0.09	0.02	0.06	0.05	0.01
Lesser scaup	0.15	0.40	0.09	0.48	1.88	0.31
Ring-necked duck	0.12	0.08	0.03	0.41	0.33	0.06
Canvasback	0.02	0.05	0.02	0.10	0.03	0.02
Ruddy duck	0.01	0.02	0.08	0.01	0.12	0.25
Redhead	0.01	0.03	0.00	0.01	0.02	0.02
Coot	0.02	0.11	0.51	0.05	0.04	0.14

In the years of this study, there were four principal free-lance hunting areas in the Illinois River valley. The Department of Conservation maintained two: one was, and is, located a short distance north of Sparland; the other on Goose Pond in the western part of Woodford County, south of Chillicothe. Spring Lake, south of Pekin in Tazewell County, was open to public duck hunting. Part of Clear Lake above and across the Illinois River from Liverpool was open to public hunters, as was part of Quiver Lake below there. Boat liveries were located on or adjacent to these places, enabling public shooters to procure transportation to shooting sites.

In addition, free-lance hunters were allowed to shoot at various places along the channel of the Illinois River, where duck clubs had not been established. Since, in most sections, duck clubs owned up to the river channel, only about 50 blinds used by public hunters were scattered along the river from Beardstown to Hennepin. While most, if not all, of the land in the Sangamon River swamplands from Chandlerville to the mouth is under private ownership, free-lance waterfowlers have found in recent years a few tracts -- 10 per cent or less of the entire region -- where the owners have not posted trespass signs. However, at any time these areas might be closed to public hunters.

Tables 3, 4 and 5 show the number of acres, hunter-days, ducks bagged, hunter-days per acre, ducks bagged per acre and average bag per hunter-day at various Illinois River public shooting grounds compared with similar data at private duck clubs during the 1940 and 1941 seasons and at private and day shooting clubs during the 1942 season. So few records were obtained from day shooting clubs in 1942 that they could have little influence on the final figures and were included with private club records. Of especial interest is the fact that the bag per acre made by free-lance waterfowlers was greater than that made per acre by duck club members during the period. However, this bag was divided among an average of over six times as many hunter-days per acre. While duck club shooters bagged an average of 6.14 ducks each per hunt, public hunters averaged 1.47 each per hunt.

Table 3.-- Hunting pressure and duck bag at public shooting grounds and at private duck shooting clubs in Illinois, 1940.

Area	Number of Acres	Number of Hunter-Days	Total Ducks Bagged	Hunter-Days Per Acre	Ducks Bagged Per Acre	Average Bag Per Hunter-Day
Sparland Public Shooting Ground	873	803	1,746	0.92	2.00	2.17
Woodford County Public Shooting Ground	1,781	1,197	946	0.67	0.53	0.79
Spring Lake (Tazewell County)	535	910	910	1.70	1.70	1.00
Liverpool Areas	800	2,821	3,419	3.53	4.27	1.21
Total	3,989	5,731	7,021	....	....	....
Average	.....	.....	.....	1.44	1.76	1.23
Private clubs (243 in number)	45,000	11,027	66,502	0.25	1.48	6.03

Table 4.-- Hunting pressure and duck bag at public shooting grounds and at private duck shooting clubs in Illinois, 1941.

Area	Number of Acres	Number of Hunter-Days	Total Ducks Bagged	Hunter-Days Per Acre	Ducks Bagged Per Acre	Average Bag Per Hunter-Day
Sparland Public Shooting Ground	873	945	1,723	1.08	1.97	1.82
Woodford County Public Shooting Ground	1,781	967	598	0.54	0.34	0.62
Spring Lake (Tazewell County)	535	1,374	1,216	2.57	2.27	0.89
Liverpool Areas	1,000	2,787	4,313	2.79	4.31	1.55
Total	4,189	6,073	7,850	....	....	....
Average	.....	.....	.....	1.45	1.87	1.29
Private clubs (308 in number)	60,000	14,659	89,670	0.24	1.49	6.12

Table 5.-- Hunting pressure and duck bag at public shooting grounds and at duck clubs (private and day shooting combined) in Illinois, 1942.

Area	Number of Acres	Number of Hunter-Days	Total Ducks Bagged	Hunter-Days Per Acre	Ducks Bagged Per Acre	Average Bag Per Hunter-Day
Sparland Public Shooting Ground	873	1,358	3,137	1.56	3.59	2.31
Woodford County Public Shooting Ground	1,781	1,329	1,492	0.75	0.84	1.12
Spring Lake (Tazewell County)	535	1,051	1,401	1.96	2.62	1.33
Liverpool Areas	1,000	3,366	6,868	3.37	6.87	2.04
Total	4,189	7,104	12,898	....	....	....
Average	....	....	....	1.70	3.08	1.82
Duck clubs (276 in number)	55,000	12,862	80,339	0.23	1.46	6.25

It should be noted from data in tables 3, 4 and 5 that each year the highest public shooting ground bag per acre occurred on the open areas near Liverpool, followed by the state-owned Sparland area, the Spring Lake and the state-owned Woodford County areas. Of especial note is the fact that the average daily bag was highest on the Sparland area, followed by the averages on the Liverpool Areas, Spring Lake and the Woodford County grounds. This peculiar situation is explained later under the discussion of the Sparland Public Shooting Ground.

Not only did public grounds average over six times as many hunter-days per acre as did private grounds in the Illinois River valley from 1940 through 1942, but, as figs. 11, 12 and 13 show, most of the public hunting was concentrated into a few days -- week-ends, especially Sundays. In contrast to public duck hunting, the shooting at clubs was spread out much more evenly through the week. Many clubs staggered the days when an individual might shoot; others had rest days, such as Sundays, when the shooting pressure in the vicinity was great.

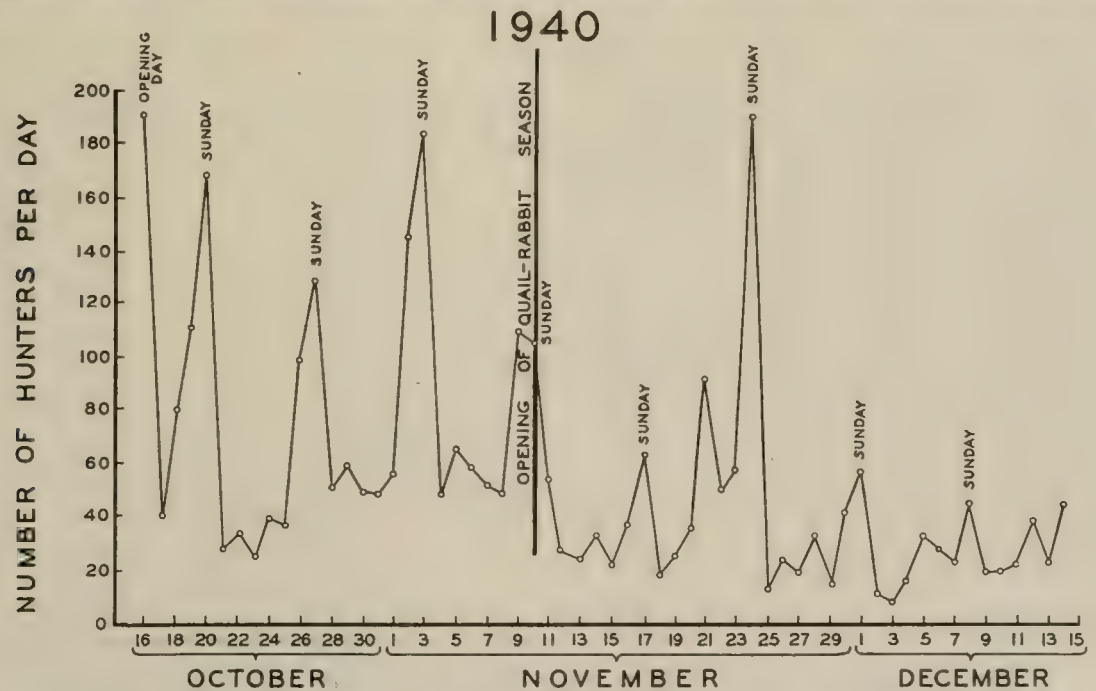

FIG. 11.-- Trend in number of hunters per day on public shooting grounds of the Illinois River valley region, 1940.

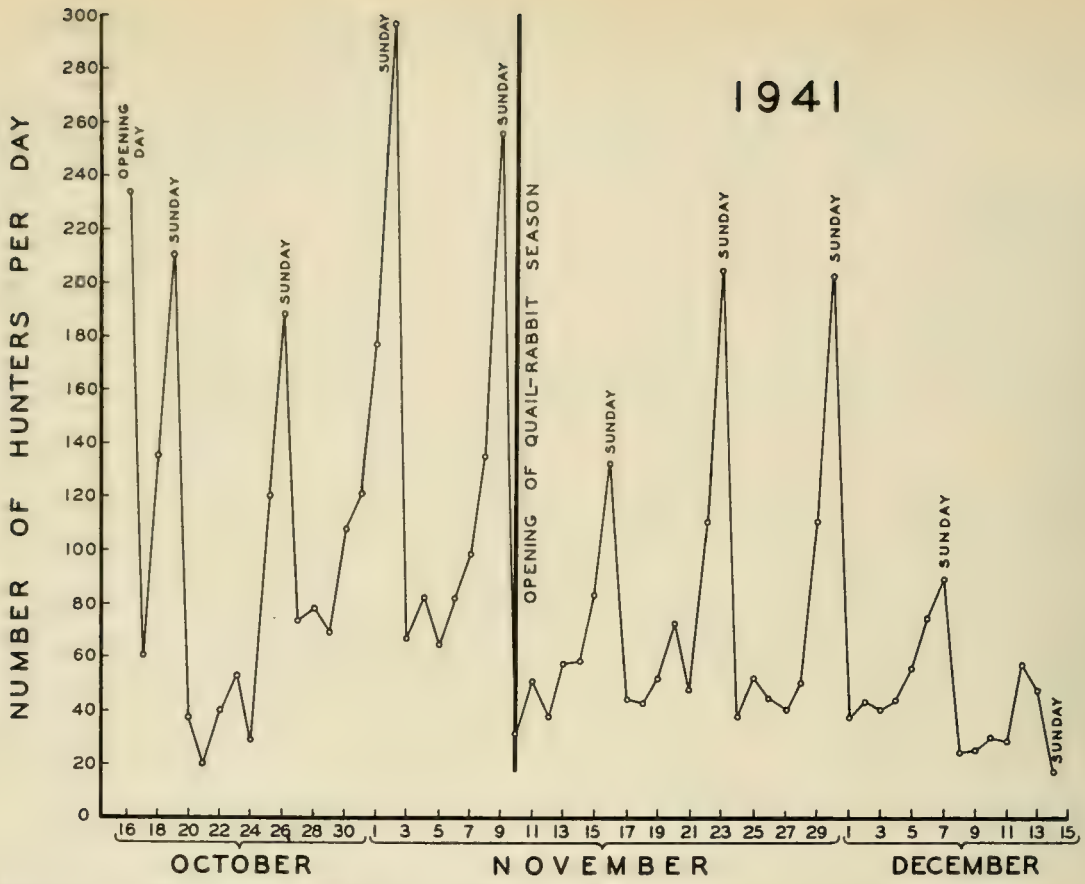

FIG. 12.-- Trend in number of hunters per day on public shooting grounds of the Illinois River valley region, 1941.

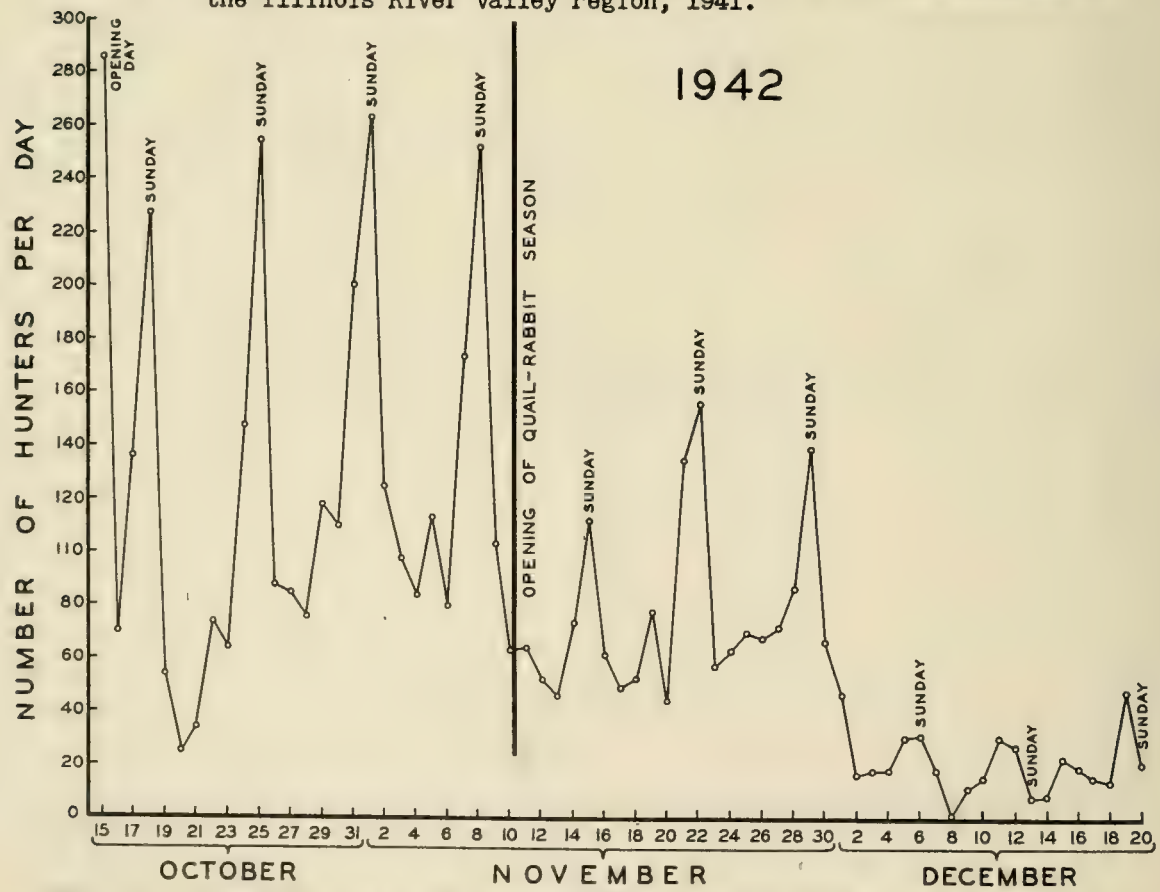

FIG. 13.-- Trend in number of hunters per day on public shooting grounds of the Illinois River valley region, 1942.

Of interest is the effect of the opening of the upland game season on the number of waterfowlers frequenting the public shooting grounds. In 1940, the number of duck shooters on Sunday, the first day of the upland game season, dropped to about half that of the previous Sunday. In 1941 and 1942, hunting pressure on the first week-end after the opening of the upland game season was about half that of the preceding week-end. With very unpleasant weather approaching zero temperatures, duck hunting declined, as evinced by the decrease in the number of hunters out during the last few weeks of the season.

A comparison of the waterfowl take of the duck clubs with that at various public shooting grounds in the Illinois River region will aid in an evaluation of the success of hunters at the various areas. Club hunters shot over four times as many ducks per hunter-day as public shooting grounds hunters. As tables 3, 4 and 5 indicate, at public shooting grounds as the number of hunters increased -- within certain limits -- so did the average kill per acre. For example, in 1940, 1.44 hunter-days per acre resulted in 1.76 ducks per acre; in 1941, 1.45 hunter-days per acre resulted in 1.87 ducks per acre; and, in 1942, 1.70 hunter-days per acre resulted in 3.08 ducks per acre. While there was bound to be some variation from year to year with changes in environment, weather, waterfowl populations and hunting regulations, in most cases the general trend was too consistent up to a certain point to be ignored. Usually, with an increase in the number of hunters per acre or per square mile, the total daily bag increased until it reached a point at which a greater number of hunters

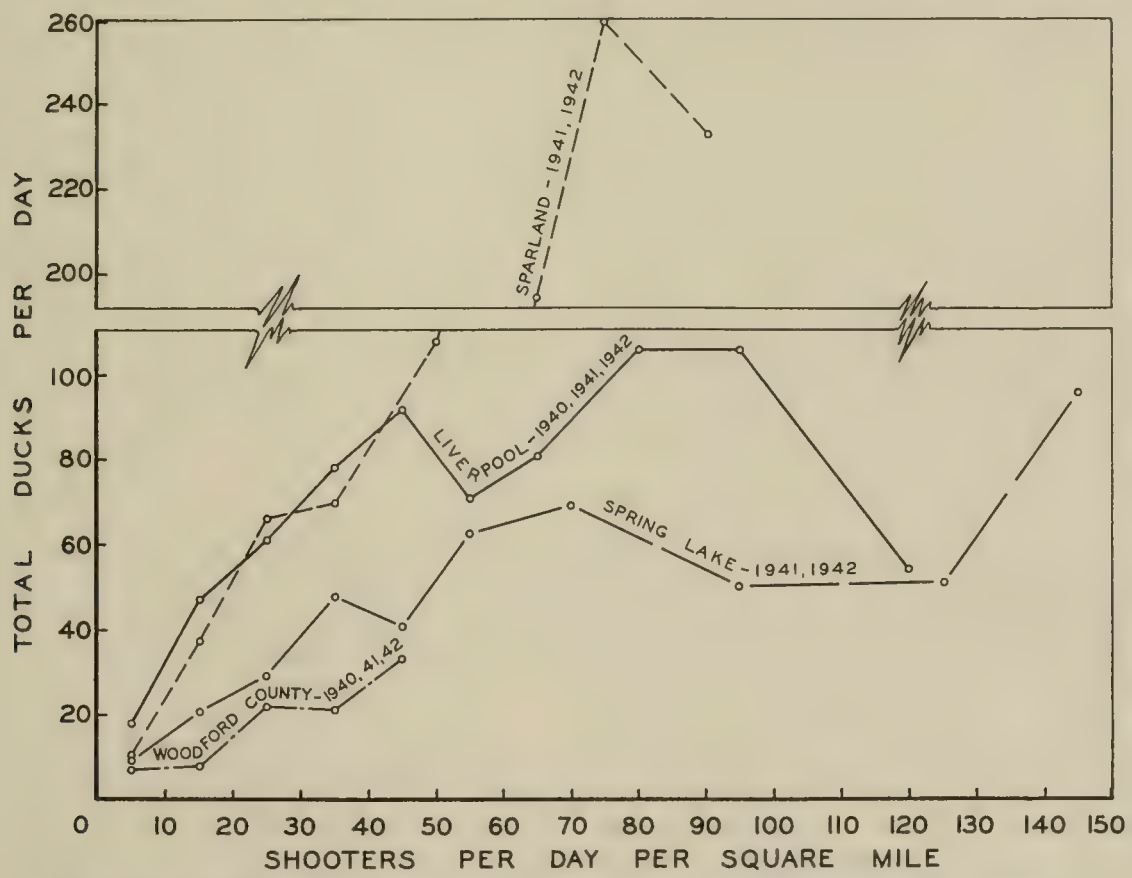

FIG. 14.-- Influence of hunting intensity on the total number of ducks killed on four Illinois River valley public shooting areas.

resulted in the daily take remaining about the same or even decreasing, fig. 14. This plateau or drop in the duck-bag curve beyond a certain point is very significant. It illustrates the fact that, because there was only a limited number of ducks available, each area had a certain carrying capacity of hunters, additions beyond which resulted in so much interference and out-of-range shooting that the total bag and the bag per acre no longer mounted but remained stationary or declined.

Although within certain limits the total daily bag on waterfowl shooting areas increased with an increase in the number of hunters, this increase was not usually great enough to maintain the bag per hunter. An increase in the number of hunters on most waterfowl areas resulted in a smaller individual bag. A very unusual exception to this general tendency occurred in 1941 and 1942 on the Sparland Public Shooting Ground, fig. 15. It will be taken up later under the discussion of that area. On other areas, a general decrease in bag per hunter occurred even with a slight increase in the number of hunters; out-of-range shooting and hunting interference became increasingly influential as the number of hunters increased. The larger the number of hunters the less likelihood there was that any hunter or hunters would allow passing ducks to swing within range of neighboring hunters. Many public shooting grounds hunters seemed prone to fire at ducks out of range either to keep their neighbors from getting a bird or on the slight chance of bringing one down. Under the competitive pressure resulting from a situation in which many hunters fired at a limited number of ducks that passed by, the spirit of good sportsmanship all too evidently decreased.

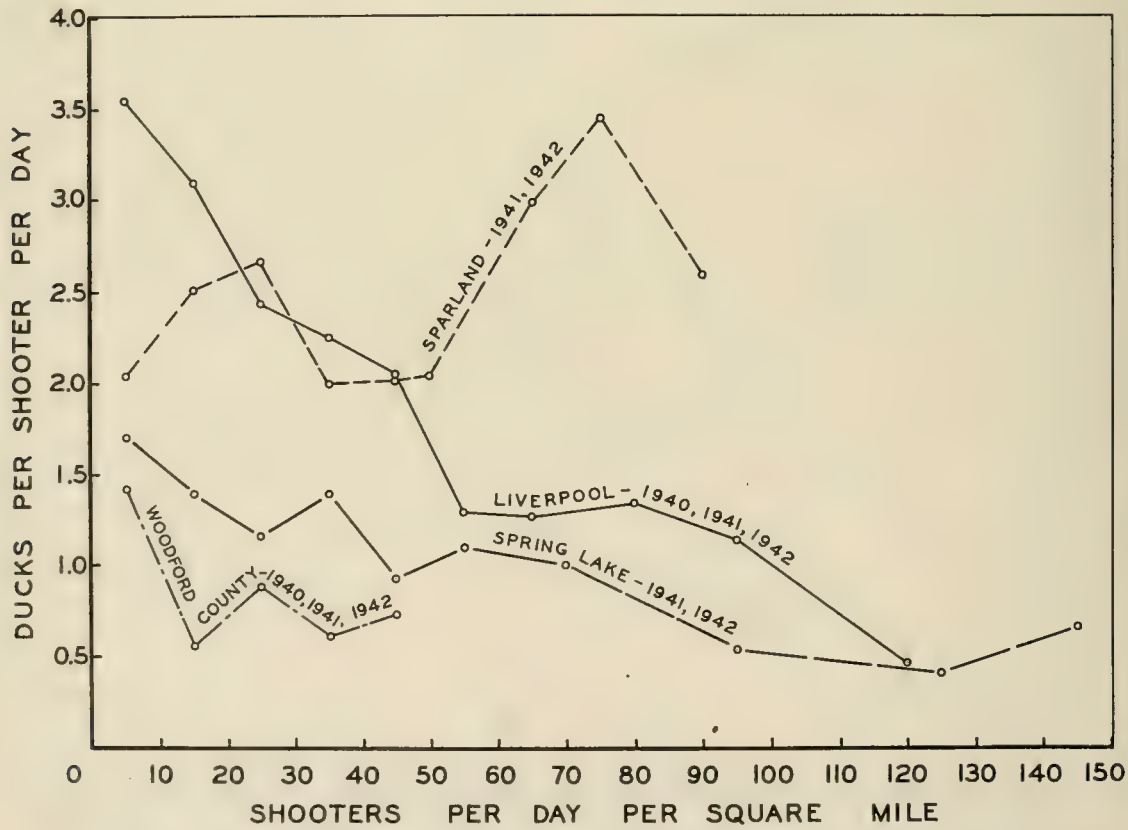

FIG. 15.-- Influence of shooting intensity on the individual daily bag of ducks on four Illinois River valley public shooting areas.

Even when there were only five hunters on a square mile of public hunting ground, fig. 15, the daily bag did not approach the average of 6.14 ducks per hunter-day made by club members. This low average was not due to the fact that the areas were not good duck grounds, for the Liverpool Areas -- due to the mass of ducks that rested on Lake Chautauqua -- were better than average, and the Sparland Ground was as good as or better than a dozen other lakes between Henry and Chillicothe. The low public hunter bag cannot be correlated with weather conditions, for figs. 11, 12 and 13 show that the number of hunters was influenced more by the time of the week than the kind of weather; peak numbers occurred on week-ends.

That the bag of the public hunting grounds shooter did not approach that made by club shooters, even when the hunting intensity was the same, may have been due in part at least to lack of experience of the public shooter, both as a marksman and as a hunter; his lack of proper equipment, such as blocks and blinds; his lack of coaching on how and when to shoot, as provided by "pushers" or guides at many clubs; and his lack of other help from guides, who may increase the take by shooting or retrieving crippled ducks.

Liverpool Areas

As a study of tables 3, 4 and 5 reveals, areas open to public hunting near Liverpool yielded three times as many ducks per acre in years of this investigation as the average for the other three open territories in the Illinois River valley. Why did the take per acre on the Liverpool Areas approximately equal the combined per-acre take of the other three shooting grounds?

The high take was due primarily to nearness of the Chautauqua National Wildlife Refuge of the U. S. Fish and Wildlife Service. The open areas near Liverpool lie adjacent to or within a short distance of the refuge, and since the refuge harbored several hundred thousand ducks during much of each season, free-lance hunters had a huge reservoir of ducks constantly in the vicinity. In addition, there were usually other thousands of ducks on the rest ground of the Clear Lake Club. From these great concentrations of waterfowl, flocks and individuals frequently detached themselves, moving over or into the public shooting ground on their flights for food.

As fig. 16 and tables 3, 4 and 5 reveal, on the basis of ducks per hunter per day the Liverpool Areas ranked second to the Sparland area in the three seasons of this study. A greater number of hunter-days per acre on the Liverpool Areas probably kept them from placing first.

Fig. 15 shows for the Liverpool and other areas the relation of hunting intensity to the average bag of ducks per hunter per day. The curves for the Woodford County and Spring Lake areas agree in showing a decline in the individual daily bag with an increase in number of hunters. The curve representing the Liverpool Areas drops more sharply. This is due to

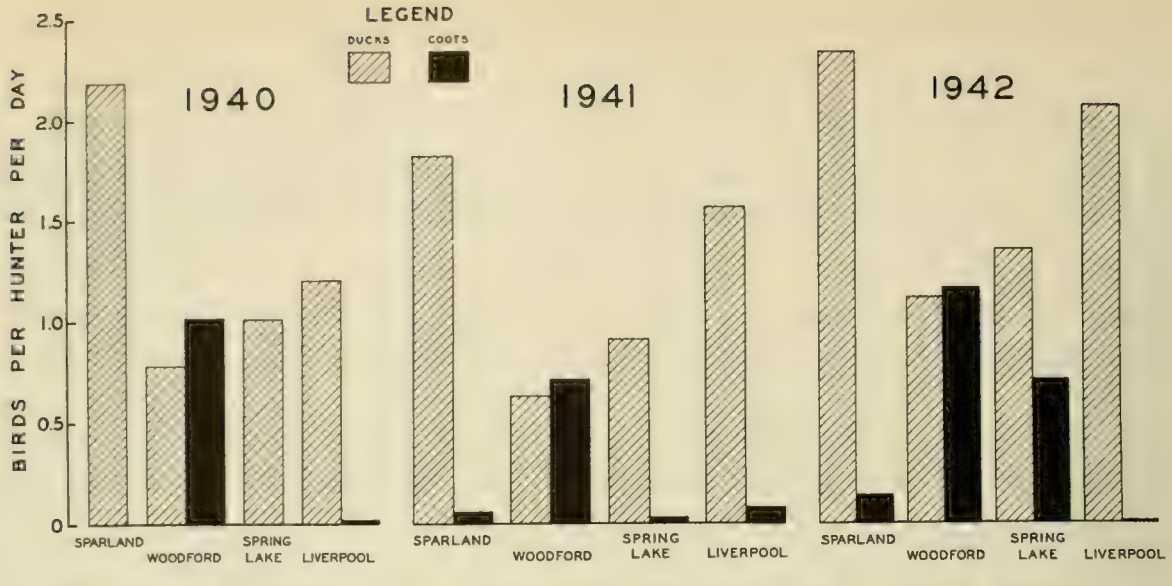

FIG. 16.-- Comparison of kill per hunter per day on four Illinois River valley public shooting grounds, 1940, 1941 and 1942.

the fact that over 60 per cent of the ducks shot at the Liverpool Areas were mallards and pintails, which are among the wariest of ducks. Once shot at, they commence climbing; they are not so apt to come within range of nearby hunters as are the lesser scaups, canvasbacks, ruddy ducks, teals, baldpates and others which make up the bulk of the bag at the other places. Hunting interference through shooting out of range is of great influence on areas predominated by mallards and pintails.

As the number of hunters passed beyond 45 per square mile per day on the Liverpool Areas, the total daily kill dropped, but later rose again until a concentration of 80 hunters per square mile was reached, fig. 14. When there were 95 hunters per square mile the total daily kill again decreased sharply. The curve indicates that about 50 hunters per square mile on any one day was the peak load for this area.

Sparland Public Shooting Ground

Data in tables 3, 4 and 5 show that, based on ducks bagged per acre, the Sparland Public Shooting Ground ranked second in 1940 and 1942 and third in 1941 among the public shooting areas of the Illinois River valley. These tables and fig. 16 disclose that each year from 1940 through 1942 the bag per hunter per day was higher at the Sparland ground than at the Liverpool Areas or elsewhere. This situation resulted from the fact that there was a greater concentration of hunters beyond the saturation point at the Liverpool Areas than at Sparland.

An unusual condition existed in 1941 and 1942 at the Sparland area in that 95 per cent or more of the birds there were ruddy ducks, which are unlike any other species in behavior. Censuses revealed that 1,000 were present on this and adjacent areas for a 4-week period during the 1941 season. During the 1942 season about 2,500 ruddies were present on the Sparland area and on adjacent Wise's Lake for a 5-week period. This greater number of ruddies in 1942 largely accounts for the 82 per cent greater kill made that year on the Sparland area.

In the 1942 season when shooting pressure was light, as on most week days, censuses revealed that from three-fourths to all the ruddies in the vicinity were on the Sparland Public Shooting Ground, the remainder on adjacent Wise's Lake. However, the situation on week-ends was different. The following account is typical of a Sunday on the Sparland area. Because of disturbances brought about by heavy hunting pressure, all but a hundred or so ruddies had left the public shooting ground by mid morning for the waters of Wise's Lake. This lake, under the control of duck clubs, served as a refuge for the ruddies, since none of the club members practiced open water shooting. Many hunters who had been shooting and rowing about in pursuit of ruddies on the Sparland lake, until they had chased most of the ducks from it, joined others already present in open boats strung across a channel an eighth mile wide, which opened into Wise's Lake. Occasionally, single ruddies or small bunches of birds detached themselves from the main body of ducks on Wise's Lake and headed down the pass toward the Sparland Public Shooting Ground. Since these birds rarely flew over 25 yards high, most of them were within range of at least one of the 30 to 50 hunters, for seldom would the ruddies alter their course to fly over the point of woods separating the lakes. On one Sunday in 1942 about 8 out of every 10 ruddies attempting to cross this line were killed; a total of 480 were bagged. Counts made on various Sundays in 1941 and 1942 revealed 20, 25, 19 and 28 boats, averaging two hunters each, strung out across the above channel.

As fig. 15 shows, the Sparland area was characterized by a general tendency, in contrast to trends at the other areas, for an increase in the number of hunters to result in an increase in the individual bag. In 1941 and 1942, a sharp increase in the individual bag resulted until the number of hunters had passed 25 per square mile. A concentration of 26 to 50 hunters per square mile produced a decreased number of ruddies per hunter, but with 51 to 75 hunters per square mile there was again a sharp accentuation in the individual bag. Over 75 hunters per square mile resulted in a reduced bag per hunter per day.

From field observations we may fairly accurately diagnose the peaks and slumps in the individual bag at Sparland. The first peak resulted apparently because an increase in the number of hunters raised a greater number of ruddies into the air from the surface of the water. This increase of ruddies in the air gave individual hunters proportionally more birds to shoot at, for ruddies make few attempts to dodge boats and almost always fly sufficiently low to be within gunshot vertically. The first slump appears to have resulted because, after the disturbance assumed great proportions, the ruddies tended to move to sections of the lake (such as the south end owned by a duck club) not so thickly populated by hunters. When there were over 50 hunters per square mile, disturbance and shooting pressure were so great that by mid morning most of the birds had left the Sparland water for Wise's Lake. This movement would have resulted in fewer ducks being killed per hunter if it had not been for the fact that during the afternoon the ruddies flew from Wise's Lake down the pass to the Sparland area. This movement gave hunters a double opportunity to kill this species and resulted in a

rise in the bag per hunter. The final slump resulted because so many hunters congregated across the pass that a barrage of out-of-range shots resulted in many a ruddy swerving to fly over the point of woods into the Sparland lake.

One other unusual situation at Sparland that permitted a higher individual bag with increased shooting pressure was the fact that heavy shooting pressure did not "burn" the ruddies out of the region. They remained, while individuals of other species left after the opening bombardment.

As fig. 14 shows, a rapid climb in the total daily take of ducks at Sparland resulted as the hunter density increased until there were 75 hunters per square mile. A further increase in hunter density beyond this point resulted in such an increase in the out-of-range shooting that the total kill declined.

As long as ruddies frequent the state-owned Sparland Public Shooting Ground in their present numbers and react to shooting as they did in 1941 and 1942, it does not appear advisable to limit the number of hunters or to build blinds. Should the shooting change to other species, it may prove expedient to limit the hunter density and to build blinds.

Spring Lake

The kill of ducks per acre at Spring Lake in the three seasons of this study was almost equal to that made on the Sparland area. But, because an average of almost twice as many hunters per acre shot at Spring Lake, the individual kill there was only about half as great. The kill per acre at Spring Lake must be considered fairly high in view of the fact that there was no rest lake adjacent. Spring Lake is a long, narrow body of water, scarcely one-fourth mile wide at any point. Because of its narrowness, ducks that use it are easily disturbed; censuses made during three fall seasons seldom revealed more than 50 to 100 ducks -- mainly redheads and widgeons -- and 500 coots on the lake.

Spring Lake contains some of the finest submerged aquatic plant beds in the Illinois River valley. Because of its excellent aquatic food resources, it is a mecca for redheads, canvasbacks, baldpates and gadwalls during the spring migration. During early April it is not unusual to see 2,000 redheads, as well as several hundred individuals of the other species. A like concentration might take place in the fall were it not for shooting and disturbances caused by boats.

Many of the ducks that frequent the area in the spring may be attracted to Spring Lake during the fall flight and may attempt to use it on their passage down the valley. Other ducks may be attracted to it from the large rest lakes a few miles away. For instance, in 1942 a flock of 35 redheads was observed resting on Beebe Lake, near Banner, during the day, flying 5 miles to Spring Lake to feed in the evening. The only large kills at Spring Lake have occurred when hunters have struck a flight of ducks passing down the valley.

As fig. 16 and tables 3, 4 and 5 show, in all three seasons of this study, duck hunting success, based on birds per hunter per day, was slightly better at Spring Lake than on the Woodford County Ground; however, many more coots per hunter per day were killed on the latter area.

As fig. 15 shows, in 1941 and 1942, at Spring Lake there was a general decline in the individual daily bag with an increase in the number of hunters. It was not so marked a drop as at the Liverpool Areas for a very good reason. Data at hand disclose that 50 per cent of the bag in 1941 and 1942 was made up of diving ducks and 35 per cent was composed of baldpates and gadwalls. These species are not so wary as mallards or pintails. When these birds are shot at out of range, or otherwise missed, there is a much better chance (than with mallards and pintails) that they will fly within range of other hunters or decoy to a neighboring blind. Thus, an increase in the number of hunters and the consequent greater amount of hunting interference is less important on areas frequented by baldpates, gadwalls and diving ducks than on mallard and pintail marshes.

Fig. 14, as it depicts the influence of hunting intensity on the take at Spring Lake, reveals that the total daily bag in 1941 and 1942 did not experience a general decline until there were over 70 hunters per square mile, although it apparently began to level off at about 55 per square mile. The sharp rise at the end of the curve lacks validity because it is due to a single sample, opening day. Spring Lake has a slightly greater hunting capacity than the Liverpool Areas for reasons already mentioned.

Woodford County Public Shooting Ground

The state-owned Woodford County Public Shooting Ground is located on Goose Pond, a vast expanse of open water contiguous with and an extension of Upper Peoria Lake. There is very little land which can be used for shooting sites, for much of the small amount of land adjacent to the area is under control of clubs.

In the three seasons covered by this study, the take of ducks per acre at the Woodford County area was less than one-fifth of the average for the other three public shooting grounds. The average daily bag per hunter was about 85 per cent of that on Spring Lake, tables 3, 4 and 5 and fig. 16. However, in addition to ducks, the Woodford waterfowlers averaged 1.1, 0.7 and 1.1 coots each per day for 1940, 1941 and 1942, respectively.

High water through the 1941 season lowered the duck and coot kill at the Woodford area, for the high water, among other things, made the usually few shooting sites still fewer. There were actually more ducks in the general vicinity in 1941 than in 1940 and more in 1942 than in any other recent year.

From the latter part of October to December, 1940, there were 25,000 to 60,000 lesser scaups and 200 to 1,500 canvasbacks on Goose Pond and Upper Peoria Lake. During the

same period in 1941, there were 35,000 to 231,000 lesser scaups and 1,000 to 10,000 canvasbacks. The population climbed again in 1942, for during the fall of that year there were about 300,000 lesser scaups and 6,000 canvasbacks.

Why were so few ducks killed when so many were present? The majority of hunters shot from open boats without concealment of any kind. Some anchored their boats and waited for a chance duck to fly by, while others attempted to "get a shot" by rowing toward rafts of ducks, stopping when ducks passed within 100 yards -- and sometimes 200 -- to pick up their shotguns and fire. On numerous Sundays early in the 1941 and 1942 seasons, I saw from 15 to 30 boats with hunters strung along the open water boundary of a hunting club. This was a favorite spot, for occasionally ducks resting on the comparatively safe waters of the club property left the area, flying over the hunters as they did so.

When rafts of diving ducks were disturbed greatly, they would move away from the public shooting ground. During the fall of 1942, it seemed impossible for many shooters on the Woodford County area to understand that, while they saw only a few thousand lesser scaups or bluebills, there were 250,000 of these birds at the lower end of 6,000-acre Upper Peoria Lake.

Fig. 15 shows for the Woodford County area one sharp drop and a total decline in the individual bag with an increase in hunter density. However, the total decline was proportionally less than at the Liverpool Areas, the apparent reason being similar to that discussed under Spring Lake. The drop was proportionally greater than at Spring Lake, undoubtedly because the ducks were able to disperse more at the Woodford County area when hunter density increased; also, because lesser scaups, which frequented the Woodford County area, are harder to kill than baldpates, gadwalls, teals and redheads, which used Spring Lake. Seventy-five per cent of the bag on the Woodford County area in 1940 was diving ducks, the bulk lesser scaups or bluebills. In 1941, 60 per cent of the bag was made up of diving ducks, the majority of which were lesser scaups.

Fig. 14 shows for the Woodford County area only a small plateau and no sharp drop in the total number of ducks bagged daily with increasing numbers of hunters. As mentioned above and discussed under the Sparland Ground and Spring Lake, there is less likelihood of an early drop occurring with certain species of ducks than with others, because hunting interference is less apt to deflect them from their course. Because of reports of a discouragingly low bag on the Woodford County area the number of hunters visiting it was never sufficiently large to bring the hunter density to the maximum carrying capacity. The fact that hunters were discouraged is illustrated by data at hand which reveal a steady decline in the number of hunters as the season advanced. This decline occurred in spite of an increase in the duck population.

IMPROVEMENT MEASURES FOR PUBLIC SHOOTING

Although complaint is heard about poor duck hunting on the public shooting areas of Illinois, rated by the quality of these lands for waterfowl shooting in 1940, 1941 and 1942, two of the four were average or better than average hunting grounds. As stated previously, the total bag on these better public areas compared favorably with the total bag made on areas of equal size controlled by duck clubs. But we find that the bag was divided among an average of over six times as many hunter-days; consequently, the bag per hunter per day was much lower than at private clubs or at day-shooting clubs, fig. 17. On public shooting areas the total duck bag increased as the number of hunters increased until a saturation point was reached. Even on those days when few public shooters were out, their average bag was below that made for the same hunter density at clubs. Some of the blame for the public hunter's low bag must be attributed to a general lack of shooting and hunting technique, although there were a few free-lance hunters who consistently bagged near-limits.

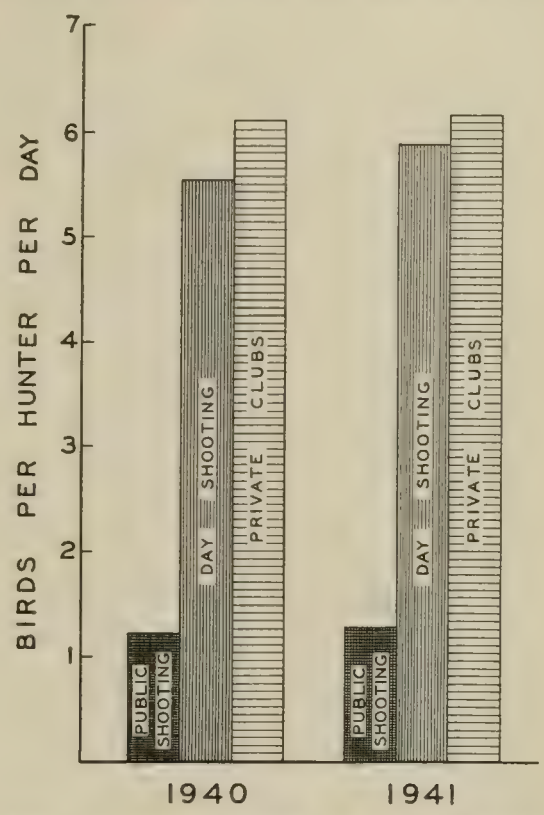

FIG. 17.--Comparison of duck kill per hunter per day at public shooting grounds, day shooting clubs and private clubs in Illinois, 1940 and 1941.

Factors such as improper concealment and lack of blocks and retrievers also tended to lower the public hunter's bag. However, because of the added fire power, the total bag rose until a point was reached at which hunting interference was a greater factor than fire power. Beyond that point the total bag declined. Hunting interference was the result of competition among a large number of hunters after a limited number of ducks. Free-lance hunters were themselves directly responsible for some of the influences reducing their success. These influences were operative most noticeably on mallard and pintail shooting grounds and least on lesser scaup and ruddy duck lakes. Measures for improving public shooting are discussed below.

Blinds

Blinds and the attendant problems were found to be very important on most public shooting grounds. The general feeling among free-lance waterfowlers was that it did not pay any one individual to put much effort into the building of a blind because he might use it only a day or two, or someone else might appropriate it. If a hunter can remain still in the proper natural surroundings, blinds are not necessary, but few hunters are adept at self-concealment. The top-ranking hunting places in the Illinois River valley are those areas with well-constructed blinds or good cover.

Undoubtedly blinds were of primary importance on the mallard areas near Liverpool, which were not owned by the state. Next in order, the Spring Lake area -- frequented by baldpates, gadwalls, lesser scaups, canvasbacks and redheads -- was affected by poor blinds and the absence of cover. This area was not state owned. Blinds would undoubtedly greatly increase the kill of ducks on the Woodford County Grounds if there were places for them. However, because of the deep open water and wave action, blinds present a very difficult problem there. Floating blinds, patterned after those used on many Michigan lakes, may be a partial solution to this problem. Another, but expensive, solution would be the construction of small islands which could hold one or two blinds. Erosion of the islands by wave action might make this plan unfeasible.

As long as ruddy ducks continue to make up the bulk of the population and bag at the Sparland area, blinds will not add materially in raising the take there. However, if the population should change and be made up principally of mallards, as in 1940, then blinds would doubtlessly raise the individual as well as total kill.

Refuge or Rest Areas

As shown by the high kill on free-lance areas near Liverpool, refuges materially aid in raising the take, for almost three times as many ducks were killed per acre in public areas near the Chautauqua National Wildlife Refuge as on other public areas, and in recent years, as more ducks have concentrated on that refuge, the kill near it has increased.

If it were not for Wise's Lake acting as a refuge area for the Sparland Public Shooting Ground, it is doubtful if the kill in the public area would have approached its total of 1940, 1941 and 1942. Ruddy ducks made good use of Wise's Lake on many days in 1941 and 1942 when hunting pressure became great on the Sparland area. If it had not been for this rest area next to their feeding grounds, they might have left the Sparland lake after the opening day barrage. One reason so many mallards were killed on this area in 1940 was that Wise's Lake harbored 25,000 to 40,000 of these birds, and individuals and flocks from this concentration often flew over or into the public shooting area. Mallards did not remain long on the Sparland area, for they will not tolerate continued disturbance.

Because the broad and extensive waters of the Peoria lakes acted as a rest area for waterfowl frequenting the Woodford County Public Shooting Ground, ducks were never forced from the region by too much shooting pressure, although driven from Goose Pond by continual disturbance.

Even narrow Spring Lake might produce a greater harvest of ducks if a part of its area were closed to trespass and hunting. Certainly more ducks would remain there, for, as evinced by its use in the spring, ducks are attracted by its excellent aquatic plant beds. In the years of this study, shooting and boating all over the lake left little room for waterfowl to congregate.

Duck clubs well realize the benefits derived from refuge or rest grounds. Through experience, they have found that rest areas allow concentrations to build up, so that a large body of ducks is always present from which they can secure a certain percentage of wanderers. Were it not for clubs with rest grounds, probably most of the Illinois mallard shooting would occur only when flights of birds pass down the valley. Nearly every large club in the Illinois River valley has set aside a rest or refuge area on its grounds.

From evidence heretofore presented, the writer is of the opinion that all public shooting grounds should either be adjacent to a refuge or have at least 50 per cent of their areas set aside where no hunting or trespassing is permitted. The U. S. Fish and Wildlife Service considers a 50-50 ratio as ideal for many of its combination refuge and public shooting grounds.

Limitation of Number of Hunters

One big question that confronts game administrators and sportsmen is whether or not the number of hunters on public shooting grounds should be limited in order to insure a higher bag per hunter. Fig. 15 conclusively shows for the Liverpool Areas and Spring Lake that the fewer the hunters the greater was the individual success. However, these areas were not controlled by the state, and therefore could not be managed by the state. On the state-owned Sparland area, conditions present in 1941 and 1942 did not warrant limiting the number of hunters. On the Woodford County Ground, fig. 15 shows, the individual bag was so low, even when there were few hunters on the area, that little would have been gained by limiting the number of hunters.

Nevertheless, if additional public shooting grounds are acquired by the state, this management phase should be given serious consideration. Hunters interviewed on public shooting grounds expressed the opinion that they would prefer to hunt seldom and be successful than hunt frequently and have little success.

It appears advisable to limit the number of hunters on most areas in most years so that an average satisfactory individual bag will be harvested. Obviously, a public shooting ground can ill afford its shooters the highest individual success, for then too few would be accommodated. Let us look into the bag made by public shooters elsewhere in the United States to determine what the average take per hunter is in other regions.

The U. S. Biological Survey (1939) once reported that daily bags of four to six birds per hunter were better than average for the country as a whole. This agency found that, on an excellent waterfowl area in Texas, the average kill was 4.4 ducks and 0.23 goose per hunter-day. According to Wilson (1938), the average duck kill per hunter-day on the 12,000-acre public shooting ground on the Bear River Migratory Bird Refuge in Utah was 4.8 in 1932, 3.2 in 1933, 3.3 in 1934, 3.0 in 1935, 4.2 in 1936 and 3.1 in 1937. (Wilson's figures are

quoted to nearest tenth.) Hunter density was comparatively light on this Utah public area, in which there were about one-seventh as many hunters per acre as on Illinois public shooting grounds. Baumgartner (1942) reports that on a managed lake in Oklahoma, where hunting was fairly successful and permits were sold at 50 cents a day, the average waterfowl bag was 1.67 birds per hunter-day. As previously stated, the average duck bag on Illinois River public shooting grounds, 1940 through 1942, was 1.47 ducks per hunter-day. We must assume from these various bags over the nation that an average bag of about three birds per hunter-day constitutes a successful hunt.

In order to average a bag of three ducks per hunter per day on the Liverpool Areas, there could be no more hunters on any one day than about 15 per square mile of shooting territory, fig. 15. For areas of comparable environmental quality, this figure might serve as a general guide. Even a limit of five hunters per square mile on the Spring Lake and the Woodford County grounds would not yield a satisfactory bag. On most areas, 50 hunters per square mile is probably the maximum number that can be provided with fair shooting.

Selection of Hunters

If it appears advisable to regulate the number of hunters so that a satisfactory bag is obtained, then a system that selects the hunters as fairly as possible must be devised. A reservation system would appear to be one of the most satisfactory methods. It might, for example, operate in this way. After a specified date, applications for hunting on a certain day and alternate day of the week might be accepted, the first applicants receiving permission to hunt the day or alternate day requested until the daily quota is reached. Then the remaining requests would be carried over to one of the corresponding days in the following week; this procedure would be repeated as many weeks as necessary. Hunters would be notified by mail in advance of the day on which they could hunt. Limiting applicants to the day selected, or an alternate day of the week, and to a provision that they could not apply for another reservation until the first one had expired, would prevent an individual from hunting on the area more than once before other individuals had been given an opportunity to hunt on that particular day of the week selected. This method of making reservations would save hunters from wasting time, money and effort, so often expended in driving long distances to a public shooting ground, only to find it overcrowded, and would greatly reduce the number of of poor, unsatisfactory bags and disgusted hunters.

Another possible way of selecting hunters would be by lottery from applications received prior to date of hunt, successful hunters being notified by mail in sufficient time to a range their trips. Perhaps less satisfactory would be a lottery conducted on the grounds each morning before the shooting hour. Some consideration might be given to distance, so that individuals traveling farthest would have better chances of hunting than local individuals.

Probably the least satisfactory method of limiting hunters would be by allowing the first individuals present -- until the quota is reached each day -- permission to hunt. This method would unduly favor near-by residents over those living at a distance. Both of the last two methods would leave hunters outside the quota anxious and prepared to hunt but with no place to go.

Additional Areas

Unless the total number of duck hunters could be limited, it is doubtful if the creation of more public shooting grounds would alone materially raise the individual take per hunt. In a state of over 7,000,000 people with over 300,000 hunters -- the majority of whom are within a few hours drive of most of the waterfowl grounds -- the addition of new areas would probably result in more non-hunters trying their hand at duck shooting, in more upland shooters turning to waterfowl and in a large proportion of the present free-lance waterfowlers hunting more frequently.

Temporarily a new area might produce a satisfactory individual kill per hunt. However, because good news is passed around and because of the potential number of waterfowlers that can be recruited from the upland hunter and non-hunter groups, it would not take very long for additional areas, as well as the present ones, to have the same high shooting pressure and low individual kill as that observed in the years of this study.

However, as funds become available, additional public shooting grounds should be created to enable more people to enjoy the sport of wildfowling. If these areas were average or better than average waterfowl shooting lands, it would be possible to furnish a satisfactory hunt by limiting the number of shooters. Fifteen thousand acres of land equal in value for hunting to the Liverpool Areas would annually provide 6,000 hunter-days of satisfactory shooting. The public shooting grounds of Illinois carried more than that number of hunter-days per year in both 1941 and 1942.

S U M M A R Y

1. In the years covered by this study, 1940 through 1942, about one out of every four hunters in Illinois pursued the sport of waterfowling.

2. Drainage and leveeing have resulted in a great loss in waterfowl habitat in the state. At the time this study was made, about 5,000,000 acres were in drainage enterprises, leaving only approximately 250,000 acres of lakes, marshes and swamps in Illinois for waterfowl grounds.

3. Because two-thirds or more of the state's limited waterfowl habitat was under private control, three out of five Illinois waterfowlers had difficulty in finding a hunting place.

4. The greater part of waterfowl hunting in the state occurred in 33 counties located in the following four general regions: (1) the Chain-O'-Lakes region in the northeastern corner; (2) the Horse Shoe Lake Area in Alexander County; (3) the Mississippi River valley from East Dubuque to Alton; and (4) the Illinois River valley from Channahon to Grafton.

5. Because most of the Chain-O'-Lakes waterfowl hunting ground was under public control, this area was subject to very heavy shooting pressure. At Grass Lake, on the opening day of the 1942 hunting season, a calculated 1,920 hunters bagged approximately 23,800 coots

and 211 ducks. The removal of about 90 per cent of the coot population the first day resulted in reduced shooting thereafter.

6. The Horse Shoe Lake Game Refuge in Alexander County has annually induced 40,000 to 50,000 Canada geese to concentrate in that area. This great concentration of geese has been responsible for the leasing or developing of much of the 15,000 acres of farm land around the refuge, for the purpose of shooting geese. From 1940 through 1942, the number of goose-hunting clubs ranged from 66 to 77 to 42.

7. About 150 duck clubs on the Illinois side of the Mississippi River obtained licenses in 1941. Only a few of these offered hunting on a daily fee basis. Mississippi River club hunters in 1940 and 1942 were over twice as successful in taking ducks as were those in the Chain-O'-Lakes district, but they shot only a fraction of the number of coots. Free-lance hunters were allowed to hunt on open areas in the Upper Mississippi River Wildlife and Fish Refuge and on publicly controlled lands along the channel south of Rock Island. At two open areas, free-lance hunters averaged, respectively, 0.92 and 2.44 ducks each per day.

8. In the years of this study, about 7 per cent of 60,000 acres of waterfowl habitat in the Illinois River valley was open to public hunting. The remaining acreage was under private ownership or controlled by the 435 duck clubs customarily active. Since completion of this study, an area of over 2,000 acres has been added to the publicly owned duck land. Private club hunters along the Illinois River averaged approximately 1.3 more ducks each per day in 1940, 1.8 more in 1941 and 0.3 more in 1942 than did club shooters along the Mississippi River.

9. While the kill per acre in the Illinois River valley was slightly greater at public shooting grounds than at private clubs, there were over six times as many free-lance hunters as club hunters per acre per day; public hunters averaged only 1.47 ducks each per hunt while club hunters averaged 6.14.

10. Most free-lance hunting along the Illinois River occurred on the opening day of the season and on week-ends, particularly on Sundays. The opening of the quail, rabbit and pheasant season brought a temporary decline in public duck hunting. The last 2 or 3 weeks of the 1940, 1941 and 1942 seasons at public waterfowl shooting grounds were characterized by hunting on a greatly reduced scale.

11. At public shooting grounds along the Illinois River, an increase in the number of hunters per acre resulted in an increased total daily bag until a point was reached at which additional hunters did not produce a greater total bag; in fact, after the hunter-saturation point was reached, increased hunting pressure resulted in a lower total bag.

12. On three public shooting grounds along the Illinois River, the size of the individual bag declined immediately with an increase in the number of hunters. However, at the Sparland Ground the daily bag at first became greater as the number of hunters increased. This was due to the presence on the area of large numbers of ruddy ducks, the behavior of which is unlike that of other waterfowl.

13. Of the four Illinois River public shooting grounds -- Sparland, Woodford County, Spring Lake, and Liverpool -- the largest bag per acre occurred on the Liverpool Areas, followed by the Sparland, Spring Lake and Woodford County grounds. The largest bag per hunter for the 3-year period was at the Sparland Area, followed by the bag at the Liverpool, Spring Lake and Woodford County grounds.

14. Methods of hunting, kinds of ducks killed, and various factors affecting the kill varied for each public shooting ground in the Illinois River valley.

15. Factors contributing to a low individual bag on public shooting grounds in the Illinois River valley were found to be (1) large number of hunters (2) hunting interference (3) inexperience of many shooters (4) lack of proper equipment.

16. Blinds would aid in raising the total bag at the public shooting grounds of the Illinois River valley other than the Sparland area, which was populated largely by ruddy ducks. It may be advisable to build floating blinds on the Woodford County Ground, for a lack of suitable shooting sites resulted in a low bag in spite of an abundance of ducks.

17. Rest or refuge areas should be established adjacent to or in connection with public shooting grounds, for they induce waterfowl populations to remain in the region.

18. On most good hunting areas, especially where the bulk of the ducks are mallards or pintails, the number of hunters should be limited to permit a satisfactory bag per hunter. This satisfactory bag might be set at an average of three ducks per hunter per day, or it might be set at the number per hunter per day at which the total kill in a given area levels off. If the first bag number is selected, it would permit, roughly, about 15 hunters per square mile; if the second policy were chosen, the capacity would be about 50 per square mile.

19. More public land should be acquired to furnish more hunters with the opportunity to hunt waterfowl. This measure alone would not necessarily raise the bag per hunter, and a satisfactory system of regulating the number of hunters should be adopted to supplement it.

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